

A.O. Smith **Water Heaters**

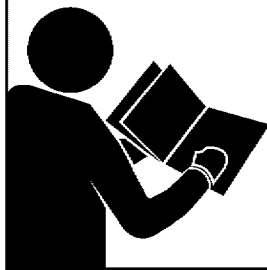
FVIR GAS WATER HEATER **(FLAMMABLE VAPOR IGNITION RESISTANT)** **FOR SPACE HEATING AND POTABLE WATER HEATING ONLY.** **NOT FOR USE IN MOBILE HOMES.**

This water heater complies with ANSI Z21.10.1-current edition regarding the accidental or unintended ignition of flammable vapors, such as those emitted by gasoline.



For Your Safety

**AN ODORANT IS ADDED TO THE GAS USED
BY THIS WATER HEATER.**



⚠ WARNING

Read and understand instruction manual and safety messages before installing, operating or servicing this water heater.

Failure to follow instructions and safety messages could result in death or serious injury.

Instruction manual must remain with water heater.

- **Safety Instructions**
- **Care and Maintenance**
- **Installation**
- **Troubleshooting**
- **Operation**
- **Parts List**

INSTALLER:

- AFFIX THESE INSTRUCTIONS TO OR ADJACENT TO THE WATER HEATER.

OWNER:

- RETAIN THESE INSTRUCTIONS AND WARRANTY FOR FUTURE REFERENCE. RETAIN THE ORIGINAL RECEIPT AS PROOF OF PURCHASE.

WARNING: Gas leaks can not always be detected by smell.

Gas suppliers recommend that you use a gas detector approved by UL or CSA.

For more information, contact the your gas supplier.

If a gas leak is detected, follow the "WHAT TO DO IF YOU SMELL GAS" instructions.



WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

ALL TECHNICAL AND WARRANTY QUESTIONS: SHOULD BE DIRECTED TO THE LOCAL DEALER FROM WHOM THE WATER HEATER WAS PURCHASED. IF YOU ARE UNSUCCESSFUL, CONTACT RESIDENTIAL TECHNICAL ASSISTANCE AT 1-800-527-1953 OR WWW.HOTWATER.COM.

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SAFE INSTALLATION, USE AND SERVICE

Your safety and the safety of others is extremely important in the installation, use and servicing of this water heater.

Many safety-related messages and instructions have been provided in this manual and on your water heater to warn you and others of a potential hazard. Read and obey all safety messages and instructions throughout this manual. It is very important that the meaning of each safety message is understood by you and others who install, use or service this water heater.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, could result in death or injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

All safety messages will generally tell you about the type of hazard, what can happen if you do not follow the safety message and how to avoid the risk of injury.

The California Safe Drinking Water and Toxic Enforcement Act requires the Governor of California to publish a list of substances known to the State of California to cause cancer, birth defects, or other reproductive harm, and requires businesses to warn of potential exposure to such substances.

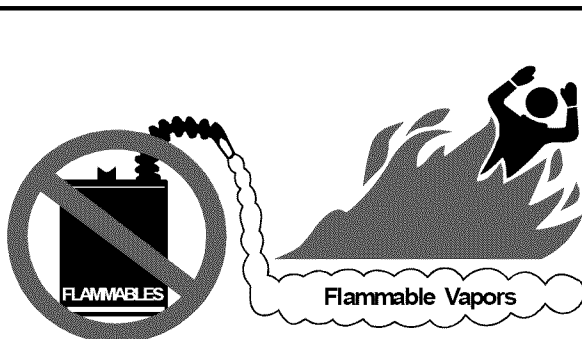
WARNING: This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

This appliance can cause low-level exposure to some of the substances included in the Act.

IMPORTANT DEFINITIONS

- **Qualified Technician:** A qualified technician must have ability equivalent to a licensed tradesman in the fields of plumbing, air supply, venting, and gas supply, including a thorough understanding of the requirements of the National Fuel Gas Code as it relates to the installation of gas fired water heaters. The qualified technician must also be familiar with the design features and use of flammable vapor ignition resistant water heaters, and have a thorough understanding of this instruction manual.
- **Service Agency:** A service agency also must have ability equivalent to a licensed tradesman in the fields of plumbing, air supply, venting and gas supply, including a thorough understanding of the requirements of the National Fuel Gas Code as it relates to the installation of gas fired water heaters. The service agency must also have a thorough understanding of this instruction manual, and be able to perform repairs strictly in accordance with the service guidelines provided by the manufacturer.
- **Gas Supplier:** The Natural Gas or Propane Utility or service who supplies gas for utilization by the gas burning appliances within this application. The gas supplier typically has responsibility for the inspection and code approval of gas piping up to and including the Natural Gas meter or Propane storage tank of a building. Many gas suppliers also offer service and inspection of appliances within the building.

SAFETY PRECAUTIONS



WARNING

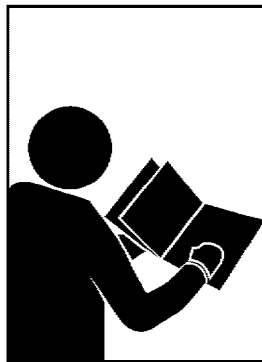
FIRE AND EXPLOSION HAZARD

Can result in serious injury or death



Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Storage of or use of gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance can result in serious injury or death.

Read and follow water heater warnings and instructions.



⚠ WARNING

Read and understand instruction manual and safety messages before installing, operating or servicing this water heater.

Failure to follow instructions and safety messages could result in death or serious injury.

Instruction manual must remain with water heater.



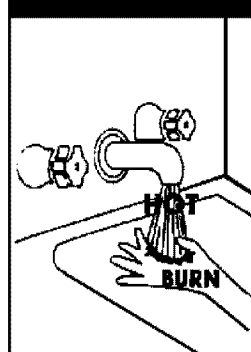
⚠ WARNING

Fire Hazard

For continued protection against risk of fire:

- Do not install water heater on carpeted floor.
- Do not operate water heater if flood damaged.

⚠ DANGER



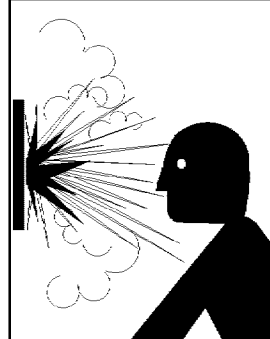
Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.

Children, the elderly, and the physically or mentally disabled are at highest risk for scald injury.

Feel water before bathing or showering.

Temperature limiting valves are available.

Read instruction manual for safe temperature setting.



⚠ WARNING

Explosion Hazard

- Overheated water can cause watertank explosion.
- Properly sized temperature and pressure relief valve must be installed in opening provided.

⚠ WARNING

Fire or Explosion Hazard

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Avoid all ignition sources if you smell Natural or LP gas.
- Do not expose water heater control to excessive gas pressure.
- Use only gas shown on rating plate.
- Maintain required clearances to combustibles.
- Keep ignition sources away from faucets after extended period of non-use.

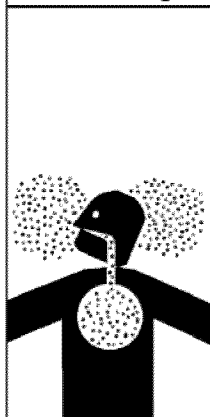


Read instruction manual before installing, using or servicing water heater.



⚠ WARNING

Breathing Hazard - Carbon Monoxide Gas



- Install vent system in accordance with codes.
- Do not operate water heater if flood damaged.
- High altitude orifice must be installed for operation above 7,700 feet (2,347m).
- Do not operate if soot is present.
- Do not obstruct water heater air intake with insulating jacket.
- Do not place chemical vapor emitting products near water heater.
- Gas and carbon monoxide detectors are available.

Breathing carbon monoxide can cause brain damage or death. Always read and understand instruction manual.

CAUTION

Improper installation and use may result in property damage.

- Do not operate water heater if flood damaged.
- Inspect and replace anode.
- Install in location with drainage.
- Fill tank with water before operation.
- Be alert for thermal expansion.

Refer to instruction manual for installation and service.

TYPICAL INSTALLATION

GET TO KNOW YOUR WATER HEATER - GAS MODELS

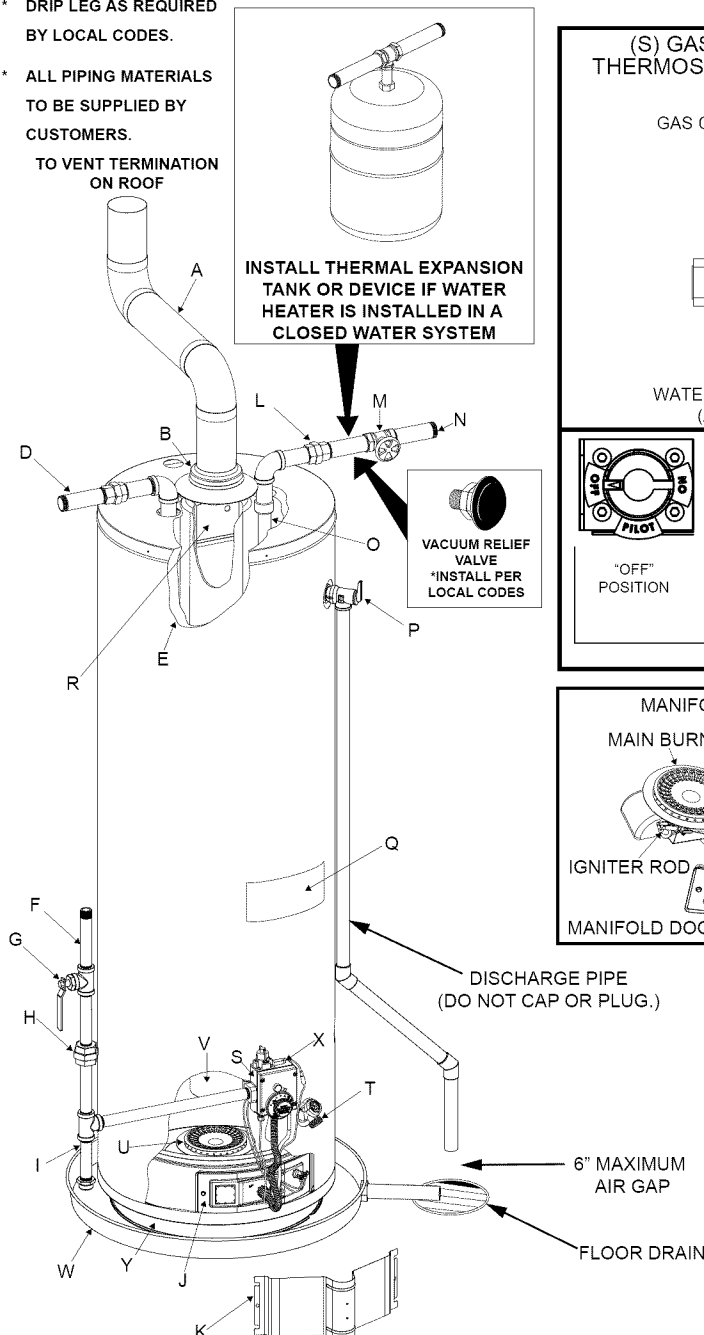
- | | | |
|-----------------------------|---------------------------------------|-------------------------|
| A Vent Pipe | J Inner Door | S Thermostat |
| B Draft hood | K Outer door | T Drain Valve |
| C Anode (Not Shown) | L Union | U Pilot and Main Burner |
| D Hot Water Outlet | M Inlet Water Shut-off Valve | V Flue |
| E Insulation | N Cold Water Inlet | W Drain Pan |
| F Gas Supply Piping | O Inlet Dip Tube | X Piezo Igniter |
| G Manual Gas Shut-off Valve | P Temperature & Pressure Relief Valve | Y Base Filter |
| H Ground Joint Union | Q Rating Plate | |
| I Drip Leg (Sediment Trap) | R Flue Baffle | |

* INSTALL IN ACCORDANCE WITH LOCAL CODES.

* DRIP LEG AS REQUIRED BY LOCAL CODES.

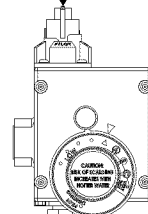
* ALL PIPING MATERIALS TO BE SUPPLIED BY CUSTOMERS.

TO VENT TERMINATION ON ROOF

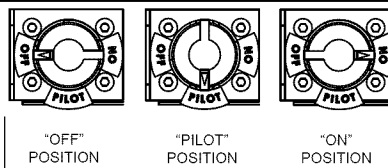


(S) GAS CONTROL VALVE/
THERMOSTAT: WHITE-RODGERS

GAS CONTROL KNOB



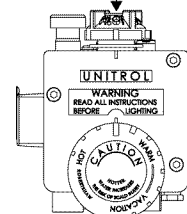
WATER TEMPERATURE DIAL
(ADJUSTING DIAL)



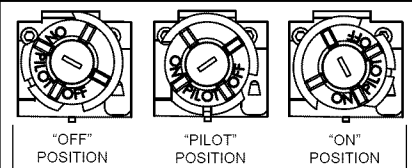
TOP VIEW

(S) GAS CONTROL VALVE/
THERMOSTAT: ROBERTSHAW

GAS CONTROL KNOB

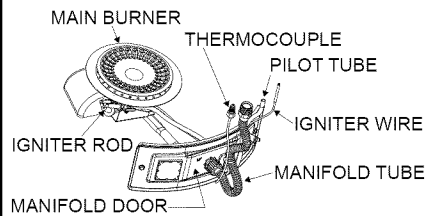


WATER TEMPERATURE DIAL
(ADJUSTING DIAL)



TOP VIEW

MANIFOLD/BURNER ASSEMBLY



INSTALLING YOUR GAS WATER HEATER

Important Information About This Water Heater

This gas water heater was manufactured to voluntary safety standards to reduce the likelihood of a flammable vapor ignition incident. New technology used in meeting these standards makes this product more sensitive to installation errors or improper installation environments. Please review the Installation Checklist found at the end of the installation instructions section and make any required installation upgrades or changes.

Consumer Information

This water heater is design-certified by CSA International as a Category I, non-direct vented water heater which takes its combustion air either from the installation area or from air ducted to the unit from the outside.

This water heater must be installed according to all local and state codes or, in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223.1(NFPA 54)-current edition. This is available from the following:

CSA America, Inc.
8501 East Pleasant Valley Road
Cleveland, OH 44131
National Fire Protection Agency
1 Batterymarch Park
Quincy, MA 02269

Check your phone listings for the local authorities having jurisdiction over your installation.

Consumer Responsibilities

This manual has been prepared to acquaint you with the installation, operation, and maintenance of your gas water heater and provide important safety information in these areas.

Read all of the instructions thoroughly before attempting the installation or operation of this water heater.

Do not discard this manual. You or future users of this water heater will need it for future reference.

Service to the FVIR System should only be performed by a qualified technician.

Examples of a qualified technician include: licensed plumbers, authorized gas company personnel, and authorized service personnel.

IMPORTANT: The manufacturer and seller of this water heater will not be liable for any damages, injuries, or deaths caused by failure to comply with the installation and operating instructions outlined in this manual.

If you lack the necessary skills required to properly install this water heater, or you have difficulty following the instructions, you should not proceed but have a qualified technician perform the installation of this water heater.

Massachusetts code requires this water heater to be installed in accordance with Massachusetts Plumbing and Fuel Gas Code 248 CMR Section 2.00 and 5.00.

A rating plate identifying your water heater can be found on the front of your water heater. When referring to your water heater, always have the information listed on the rating plate readily available. Retain your original receipt as proof of purchase.

Unpacking the Water Heater

WARNING

Excessive Weight Hazard

**Use two or more people to move and install the water heater.
Failure to do so can result in injury (including back injury).**

IMPORTANT: Do not remove any permanent instructions, labels, or the data label from either the outside of the water heater or on the inside of water heater panels.

- Remove exterior packaging and place installation components aside.
- Inspect all parts for damage prior to installation and start-up.
- Completely read all instructions before attempting to assemble and install this product.
- After installation, dispose of/recycle all packaging materials.

Location Requirements

WARNING

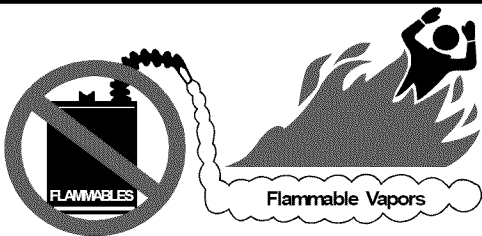
Carbon Monoxide Poisoning Hazard

Do not install in a mobile home.

Doing so can result in carbon monoxide poisoning and death.

The FVIR System is designed to reduce the risk of flammable vapor-related fires. The patented system protects your family by trapping the burning vapors within the water heater combustion chamber through the special flame-arrestor. The burning vapors literally “burn themselves out” without escaping back into the room. In the event of a flammable vapor incident, the FVIR System disables the water heater by shutting off the gas supply to the water heater’s burner and pilot, preventing re-ignition of any remaining flammable vapors in the area. This will not prevent a possible fire/explosion if the igniter is depressed and flammable vapors have accumulated in the combustion chamber with the pilot light off. If you suspect a flammable vapor incident has occurred, do not use this appliance. Do not attempt to light this appliance, or depress the igniter button if you suspect flammable vapors have accumulated inside or outside the appliance. Immediately call a qualified technician to inspect the appliance. Water heaters subjected to a flammable vapors incident will show a discoloration on the flame-arrestor and require replacement of the entire water heater.

WARNING



FIRE AND EXPLOSION HAZARD

Can result in serious injury or death

 **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Storage of or use of gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance can result in serious injury or death.**

Read and follow water heater warnings and instructions

Do not use or store flammable products such as gasoline, solvents, or adhesives in the same room or area near the water heater. If such flammables must be used, all gas burning appliances in the vicinity must be shut off and their pilot lights extinguished. Open the doors and windows for ventilation while flammable substances are in use.

If flammable liquids or vapors have spilled or leaked in the area of the water heater, leave the area immediately and call the fire department from a neighbor's home. Do not attempt to clean the spill until all ignition sources have been extinguished.

WARNING

Fire or Explosion Hazard

- **Read instruction manual before installing, using or servicing water heater.**
- **Improper use may result in fire or explosion.**
- **Maintain required clearances to combustibles.**

Keep combustibles such as boxes, magazines, clothes, etc. away from the water heater area.

Site Location

- Select a location near the center of the water piping system. The water heater must be installed indoors and in a vertical position on a level surface. **DO NOT** install in bathrooms, bedrooms, or any occupied room normally kept closed.
- Locate the water heater as close to the chimney or gas vent as practical. Consider the vent system piping and combustion air supply requirements when selecting the water heater location. The venting system must be able to run from the water heater to termination with minimal length and elbows.
- Locate the water heater near the existing gas piping. If installing a new gas line, locate the water heater to minimize the pipe length and elbows.
- The water heater should be located in an area not subject to freezing temperatures. Water heaters located in unconditioned spaces (i.e., attics, basements, etc.) may require insulation of the water piping and drain piping to protect against freezing. The drain and controls must be easily accessible for operation and service. Maintain proper clearances as specified on the rating plate.
- Do not locate the water heater near an air-moving device. The operation of air-moving devices such as exhaust fans, ventilation systems, clothes dryers, fireplaces, etc., can affect the proper operation of the water heater. Special attention must be given to conditions these devices may create. Flow reversal of flue gases may cause an increase of carbon monoxide inside of the dwelling (Figure 1).
- If the water heater is located in an area that is subjected to lint and dirt, it may be necessary to periodically clean the base-ring filter and flame-arrestor (see External Inspection & Cleaning of the Flame-arrestor).

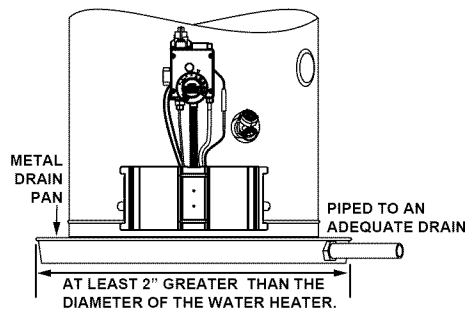
NOTE: This water heater must be installed according to all local and state codes or, in the absence of local and state codes, the “National Fuel Gas Code”, ANSI Z223.1(NFPA 54)-current edition.

CAUTION

Property Damage Hazard

- All water heaters eventually leak
- Do not install without adequate drainage.

IMPORTANT: The water heater should be located in an area where leakage of the tank or connections will not result in damage to the area adjacent to the water heater or to lower floors of the structure. Due to the normal corrosive action of water, the tank will eventually leak after an extended period of time. Also any external plumbing leak, including those from improper installation, may cause early failure of the tank due to corrosion if not repaired. If the homeowner is uncomfortable with making the repair a qualified technician should be contacted. A suitable metal drain pan should be installed under the water heater as shown below, to help protect the property from damage which may occur from condensate formation or leaks in the piping connections or tank. The pan must limit the water level to a maximum depth of 1-3/4" and be two inches wider than the heater and piped to an adequate drain. **NOTE:** The pan must not restrict combustion air flow. Locate the water heater near a suitable indoor drain. Outside drains are subject to freezing temperatures which can obstruct the drain line. The piping should be at least 3/4" ID and pitched for proper drainage.



Water heater life depends upon water quality, water usage, water temperature and the environment in which the water heater is installed. Water heaters are sometimes installed in locations where leakage may result in property damage, even with the use of a drain pan piped to a drain. However, unanticipated damage can be reduced or prevented by a leak detector or water shut-off device used in conjunction with a piped drain pan. These devices are available from some plumbing supply wholesalers and retailers, and detect and react to leakage in various ways:

- Sensors mounted in the drain pan that trigger an alarm or turn off the incoming water to the water heater when water is detected.
- Sensors mounted in the drain pan that turn off the water supply to the entire home when water is detected in the drain pan.
- Water supply shut-off devices that activate based on the water pressure differential between the cold water and hot water pipes connected to the water heater.
- Devices that will turn off the gas supply to a gas water heater while at the same time shutting off its water supply.

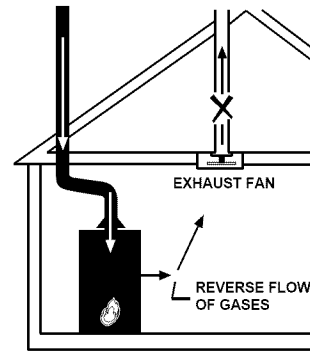


FIGURE 1.

Clearances and Accessibility

NOTE: Minimum clearances from combustible materials are stated on the rating plate adjacent to the gas control valve/thermostat of the water heater.

The water heater is certified for installation on a combustible floor.

- **IMPORTANT:** If installing over carpeting, the carpeting must be protected by a metal or wood panel beneath the water heater. The protective panel must extend beyond the full width and depth of the water heater by at least three inches (76.2mm) in any direction; or if in an alcove or closet installation, the entire floor must be covered by the panel.
- Figure 2 may be used as a reference guide to locate the specific clearance locations. A minimum of 24 inches of front clearance should be provided for inspection and service.

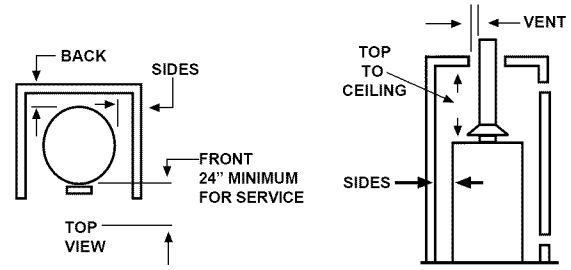


FIGURE 2.

State of California

NOTE: The water heater must be braced, anchored, or strapped to avoid moving during an earthquake. Contact local utilities for code requirements in your area, visit <http://www.dsa.dgs.ca.gov>, or call 1-916-445-8100 and request instructions.

GAS SUPPLY

⚠ WARNING



Explosion Hazard

- Use a new CSA approved gas supply line.
- Install a shut-off valve.
- Do not connect a natural gas water heater to an L.P. gas supply.
- Do not connect an L.P. gas water heater to a natural gas supply.
- Failure to follow these instructions can result in death, explosion, or carbon monoxide poisoning.

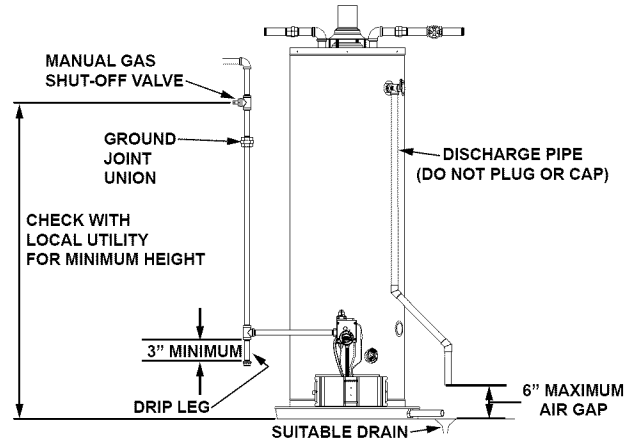


FIGURE 3.

Gas Pressure

⚠ WARNING



Explosion Hazard

- Gas leaks can not always be detected by smell.
- Gas suppliers recommend that you use a gas detector approved by UL or CSA.
- For more information, contact your gas supplier.
- If a gas leak is detected, follow the "What to do if you smell gas" instructions on the cover of this manual.

IMPORTANT: The gas supply pressure must not exceed the maximum supply pressure as stated on the water heater's rating plate. The minimum supply pressure is for the purpose of input adjustment.

Gas Pressure Testing

IMPORTANT: This water heater and its gas connection must be leak tested before placing the appliance in operation.

- If the code requires the gas lines to be tested at a pressure exceeding 14" W.C., the water heater and its manual shut-off valve must be disconnected from the gas supply piping system and the line capped.
- If the gas lines are to be tested at a pressure less than 14" W.C., the water heater must be isolated from the gas supply piping system by closing its manual shut-off valve.

NOTE: Air may be present in the gas lines and could prevent the pilot from lighting on initial start-up. The gas lines should be purged of air by a qualified technician after installation of the gas piping system. While purging the gas piping system of air, insure that the fuel is not spilled in the area of the water heater installation, or any source of ignition. If the fuel is spilled while purging the piping system of air follow the "WHAT TO DO IF YOU SMELL GAS" instructions on the cover of this manual.

Gas Requirements

IMPORTANT: Read the rating plate to be sure the water heater is made for the type of gas you will be using in your home. This information will be found on the rating plate located near the gas control valve/thermostat. If the information does not agree with the type of gas available, do not install or light. Call your dealer.

NOTE: An odorant is added by the gas supplier to the gas used by this water heater. This odorant may fade over an extended period of time. Do not depend upon this odorant as an indication of leaking gas.

Gas Piping

The gas piping must be installed according to all local and state codes or, in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223.1(NFPA 54)-current edition.

Tables 1 and 2 on the following page provide a sizing reference for commonly used gas pipe materials. Consult the "National Fuel Gas Code" for the recommended gas pipe size of other materials.

NOTE: Use pipe joint compound or teflon tape marked as being resistant to the action of petroleum [Propane (L.P.)] gases (See Figure 3.)

1. Install a readily accessible manual shut-off valve in the gas supply line as recommended by the local utility. Know the location of this valve and how to turn off the gas to this unit.
2. Install a drip leg (if not already incorporated as part of the water heater) as shown. The drip leg must be no less than three inches long for the accumulation of dirt, foreign material, and water droplets.
3. Install a ground joint union between the gas control valve/thermostat and the manual shut-off valve. This is to allow easy removal of the gas control valve/thermostat.
4. Turn the gas supply on and check for leaks. Test all connections by brushing on an approved noncorrosive leak-detection solution. Bubbles will show a leak. Correct any leak found.

LP Gas Only

⚠ WARNING



Explosion Hazard

Have a qualified person make sure L.P. gas pressure does not exceed 13" water column.

Examples of a qualified person include: licensed plumbers, authorized gas company personnel, and authorized service personnel.

Failure to do so can result in death, explosion, or fire.

Liquefied petroleum gas is over 50% heavier than air and in the occurrence of a leak in the system, the gas will settle at floor level. Basements, crawl spaces, closets and areas below ground level will serve as pockets for the accumulation of gas. Before lighting an L.P. gas water heater, smell all around the appliance at floor level. If you smell gas, follow the instructions as given in the warning on the front page.

When your L.P. tank runs out of fuel, turn off the gas at all gas appliances including pilot lights. After the tank is refilled, all appliances must be re-lit according to their manufacturer's instructions.

Table 1
Natural Gas Pipe Capacity Table (Cu. Ft./Hr.)

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

Nominal Iron Pipe Size, in.	Length of Pipe, Feet													
	10	20	30	40	50	60	70	80	90	100	125	150	175	200
1/2	132	92	73	63	56	50	46	43	40	38	34	31	28	26
3/4	278	190	152	130	115	105	96	90	84	79	72	64	59	55
1	520	350	285	245	215	195	180	170	160	150	130	120	110	100
1-1/4	1050	730	590	500	440	400	370	350	320	305	275	250	225	210
1-1/2	1600	1100	890	760	670	610	560	530	490	460	410	380	350	320

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the water heater. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Water Heater (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the water heater is marked on the water heater data plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility.

Table 2
LP Gas Capacity Table

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column pressure). Based on a pressure drop of 0.5 inch water column.

Nominal Iron Pipe Size, in.	Length of Pipe, Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	576	393	315	267	237	217	196	185	173	162	146	132
1	1071	732	590	504	448	409	378	346	322	307	275	252
1-1/4	2205	1496	1212	1039	913	834	771	724	677	630	567	511

Example: Input BTU requirement of the water heater 100,000 BTUH.
Total pipe length, 80 feet = 3/4" IPS required.

Additional tables are available in the latest edition of the "National Fuel Gas Code", ANSI Z223.1.

COMBUSTION AIR & VENTILATION

! WARNING

Carbon Monoxide Warning

Water heater must be vented to outdoors.

Vent must be installed by a qualified technician using the installation instructions.

Examples of a qualified technician include: gas technicians, authorized gas company personnel, and authorized service persons.

Failure to so do can result in death or carbon monoxide poisoning.

IMPORTANT: Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.

The following types of installation (not limited to the following) will require outdoor air for combustion due to chemical exposure and may reduce but not eliminate the presence of corrosive chemicals in the air:

- beauty shops
- photo processing labs
- buildings with indoor pools
- water heaters installed in laundry, hobby, or craft rooms
- water heaters installed near chemical storage areas

Combustion air must be free of acid-forming chemicals such as sulfur, fluorine, and chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint, and varnish removers, refrigerants, and many other commercial and household products. When burned, vapors from these products form highly corrosive acid compounds. These products should not be stored or used near the water heater or air inlet.

Combustion and ventilation air requirements are determined by the location of the water heater. The water heater may be located in either an open (unconfined) area or in a confined area or small enclosure such as a closet or small room. Confined spaces are areas with less than 50 cubic feet for each 1,000 BTUH of the total input for all gas-using appliances.

Unconfined Space

A water heater in an unconfined space uses indoor air for combustion and requires at least 50 cubic feet for each 1,000 BTUH of the total input for all gas appliances. The table below shows a few examples of the minimum square footage (area) required for various BTUH inputs.

TABLE 3

BTUH Input	Minimum Square Feet with 8' Ceiling	Typical Room with 8' Ceiling
30,000	188	9 x 21
45,000	281	14 x 20
60,000	375	15 x 25
75,000	469	15 x 31
90,000	563	20 x 28
105,000	657	20 x 33
120,000	750	25 x 30
135,000	844	28 x 30

IMPORTANT:

- The area must be open and be able to provide the proper air requirements to the water heater. Areas that are being used for storage or contain large objects may not be suitable for water heater installation.
- Water heaters installed in open spaces in buildings with unusually tight construction may still require outdoor air to function properly. In this situation, outside air openings should be sized the same as for a confined space.
- Modern home construction usually requires supplying outside air into the water heater area.

Confined Space

For the correct and proper operation of this water heater, ample air must be supplied for the combustion, ventilation, and dilution of flue gases. Small enclosures and confined areas must have two permanent openings so that sufficient fresh air can be drawn from outside of the enclosure. One opening shall be within 12 inches of the top and one within 12 inches of the bottom of the enclosure as shown in Figure 4.

The size of each opening (free area) is determined by the total BTUH input of all gas utilization equipment (i.e., water heaters, furnaces, clothes dryers, etc.) and the method by which the air is provided. The BTUH input can be found on the water heater rating plate. Additional air can be provided by two methods:

1. All air from inside the building.
2. All air from outdoors.

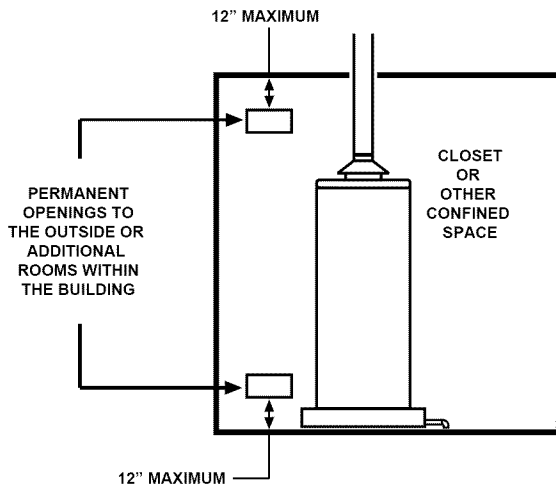


FIGURE 4.

All Air from Inside the Building

When additional air is to be provided to the confined area from additional room(s) within the building, the total volume of the room(s) must be of sufficient size to properly provide the necessary amount of fresh air to the water heater and other gas utilization equipment in the area. If you are unsure that the structure meets this requirement, contact your local gas utility company or other qualified agency for a safety inspection.

Each of the two openings shall have a minimum free area of 1 square inch per 1,000 BTUH of the total input rating of all gas utilization equipment in the confined area, but not less than 100 square inches (Figure 5).

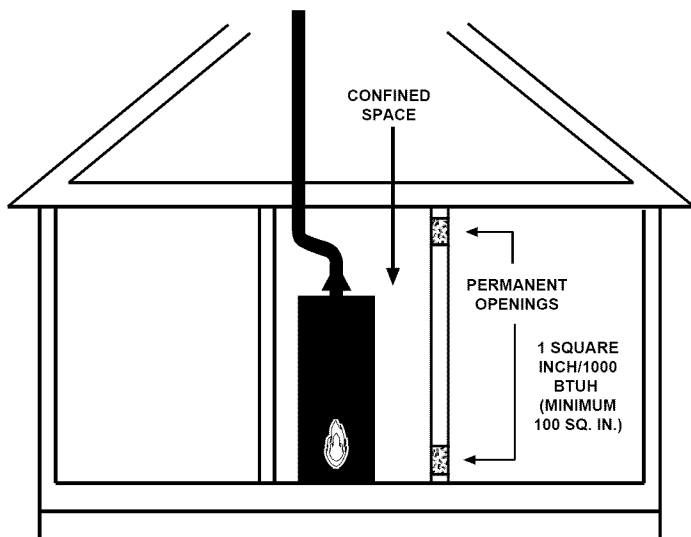


FIGURE 5.

All Air from Outdoors

Outdoor fresh air can be provided to a confined area either directly or by the use of vertical and horizontal ducts. The

fresh air can be taken from the outdoors or from crawl or attic spaces that freely communicate with the outdoors. Attic or crawl spaces cannot be closed and must be properly ventilated to the outside.

Ductwork must be of the same cross-sectional area as the free area of the opening to which they connect. The minimum dimension of rectangular air ducts cannot be less than three inches.

The size of each of the two openings is determined by the method in which the air is to be provided. Refer to Table 4 to calculate the minimum free area for each opening. Figures 6, 7, 8A and 8B are typical examples of each method.

Louvers and Grilles

In calculating free area for ventilation and combustion air supply openings, consideration must be given to the blocking effect of protection louvers, grilles, and screens. These devices can reduce airflow, which in turn may require larger openings to achieve the required minimum free area. Screens must not be smaller than 1/4" mesh. If the free area through a particular design of louver or grille is known, it should be used in calculating the specified free area of the opening. If the design and free area are not known, it can be assumed that most wood louvers will allow 20 - 25% of free area while metal louvers and grilles will allow 60 - 75% of free area.

Louvers and grilles must be locked open or interconnected with the equipment so that they are opened automatically during equipment operation.

Keep louvers and grilles clean and free of debris or other obstructions.

TABLE 4

Minimum Free Area of Permanent Openings for Ventilation and Combustion Air Supply - All Air from Outdoors Only.

Based on total BTUH input rating for all utilizing equipment within the confined space.

Opening Source	Minimum Free Area Per Opening (sq. in.)	Reference Drawing
*Direct to outdoors	1 sq. in. per 4000 BTUH	Figure 6
Vertical Ducts	1 sq. in. per 4000 BTUH	Figure 7
Horizontal Ducts	1 sq. in. per 2000 BTUH	Figure 8
Single Opening	1 sq. in. per 3000 BTUH	Figure 8A

Example: A water heater with an input rating of 50,000 BTUH using horizontal ducts would require each opening to have a minimum free area of 25 square inches.

Minimum free area = 50,000 BTUH x 1 sq. in. / 2000 BTUH = 25 sq. in.

* These openings connect directly with the outdoors through a ventilated attic, a ventilated crawl space, or through an outside wall.

Consult the local codes of your area for specific ventilation and combustion air requirements.

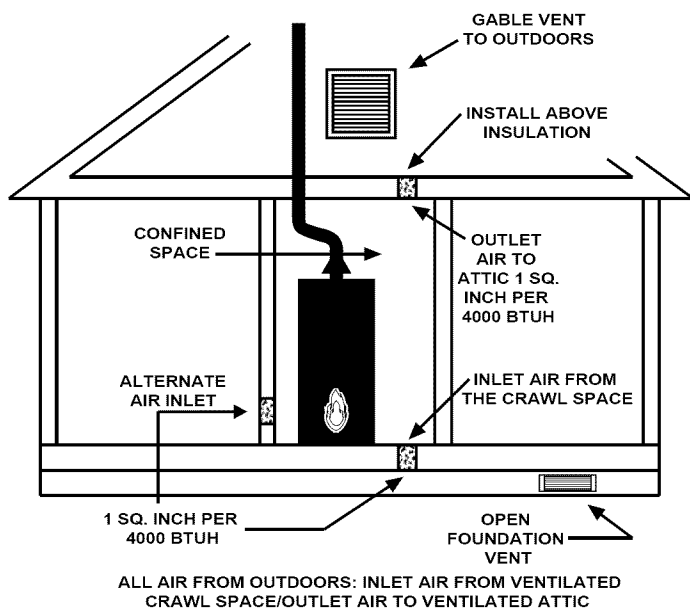


FIGURE 6.

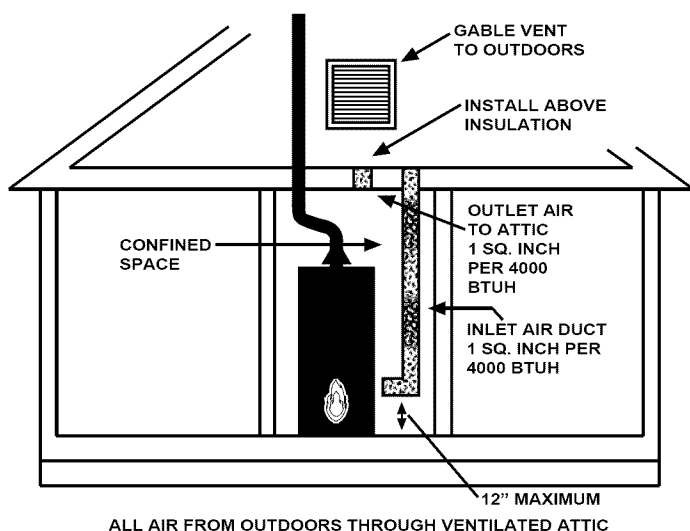


FIGURE 7.

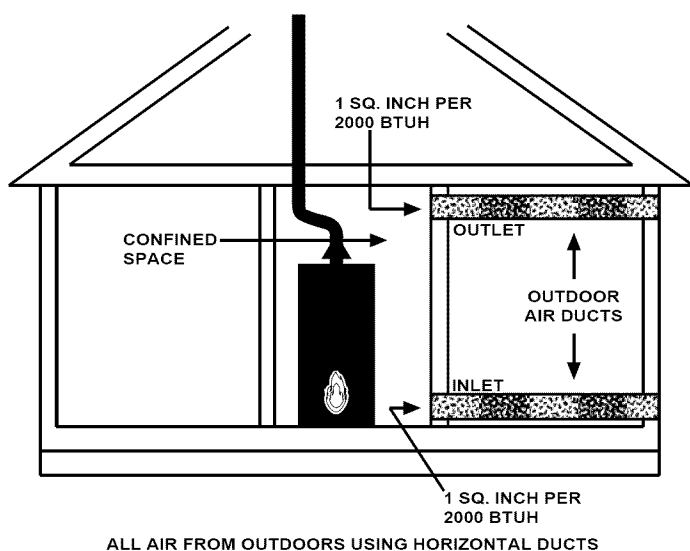


FIGURE 8A.

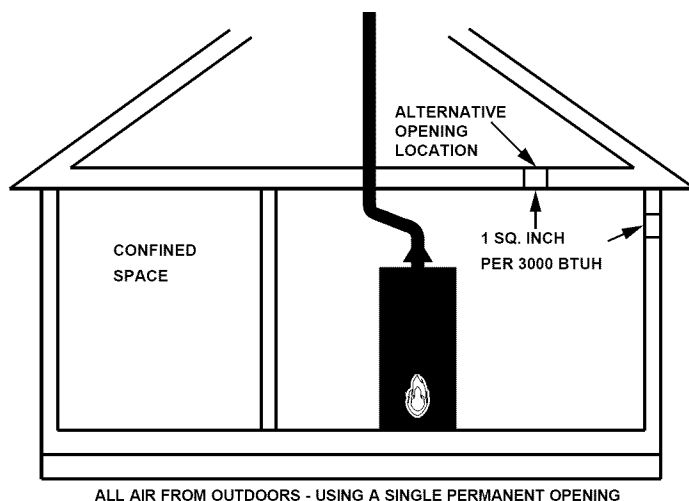


FIGURE 8B.

Vent Pipe System

This water heater uses a non-direct, single-pipe vent system to remove exhaust gases created by the burning of fossil fuels. Air for combustion is taken from the immediate water heater location or is ducted in from the outside (see "Combustion Air Supply and Ventilation").

This water heater must be properly vented for the removal of exhaust gases to the outside atmosphere. Correct installation of the vent pipe system is mandatory for the proper and efficient operation of this water heater and is an important factor in the life of the unit.

The vent pipe must be installed according to all local and state codes or, in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223.1(NFPA 54)-current edition. The vent pipe installation must not be obstructed so as to prevent the removal of exhaust gases to the outside atmosphere.

IMPORTANT: The use of vent dampers is not recommended by the manufacturer of this water heater. Although some vent dampers are certified by CSA International, this certification applies to the vent damper device only and does not mean they are certified for use on this water heater.

U.L. recognized fuel gas and carbon monoxide (CO) detectors are recommended in all applications and should be installed using the manufacturer's instructions and local codes, rules, or regulations.

IMPORTANT: If you lack the necessary skills required to properly install this venting system, you should not proceed, but get help from a qualified technician.

Draft Hood Installation

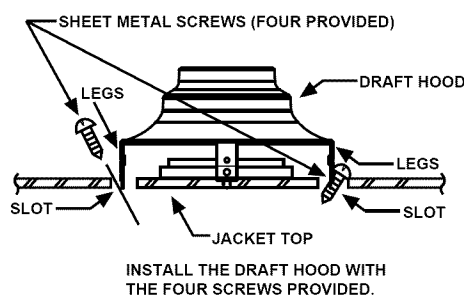


FIGURE 9

Align the legs of the draft hood with the slots provided. Insert the legs and secure the draft hood to the water heater's top with the four screws provided as shown in Figure 9. Do not alter the draft hood in any way. If you are replacing an existing water heater, be sure to use the draft hood supplied with this water heater.

Vent Pipe Size

It is important that you follow the guidelines in these instructions for sizing a vent pipe system. If a transition to a larger vent size is required, the vent transition connection must be made at the draft hood outlet.

Vent Connectors

1. Type B, Double wall, U.L. Listed Vent Pipe.
2. Single wall Vent Pipe.

Maintain the manufacturer's specified minimum clearance from combustible materials when using type B double wall vent pipe.

Vent connectors made of type B, double wall vent pipe material may pass through walls or partitions constructed of combustible material if the minimum listed clearance is maintained.

Maintain a six inch minimum clearance from all combustible materials when using single wall vent pipe.

IMPORTANT: Single wall vent pipe cannot be used for water heaters located in attics and may not pass through attic spaces, crawl spaces or any confined or inaccessible location. A single wall metal vent connector cannot pass through any interior wall.

When installing a vent connector, please note the following (See Figures 10-12):

- Install the vent connector avoiding unnecessary bends, which create resistance to the flow of vent gases.
- Install without dips or sags with an upward slope of at least 1/4-inch per foot.
- Joints must be fastened by sheet metal screws or other approved means. It must be supported to maintain clearances and prevent separation of joints and damage.
- The length of the vent connector cannot exceed 75% of the vertical vent height.
- The vent connector must be accessible for cleaning, inspection, and replacement.
- Vent connectors cannot pass through any ceiling, floor, firewall, or fire partition.
- It is recommended (but not mandatory) that a minimum 12 inches of vertical vent pipe be installed on the draft hood prior to any elbow in the vent system.

IMPORTANT: Existing vent systems must be inspected for obstructions, corrosion, and proper installation.

Chimney Connection

IMPORTANT: Before connecting a vent to a chimney, make sure the chimney passageway is clear and free of obstructions. The chimney must be cleaned if previously used for venting solid fuel appliances or fireplaces. Also consult local and state codes for proper chimney sizing and application or, in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223.1(NFPA 54)-current edition.

- The connector must be installed above the extreme bottom of the chimney to prevent potentially blocking the flue gases.
- The connector must be firmly attached and sealed to prevent it from falling out.
- To aid in removing the connector, a thimble or slip joint may be used.
- The connector must not extend beyond the inner edge of the chimney as it may restrict the space between it and the opposite wall of the chimney (Figure 10).

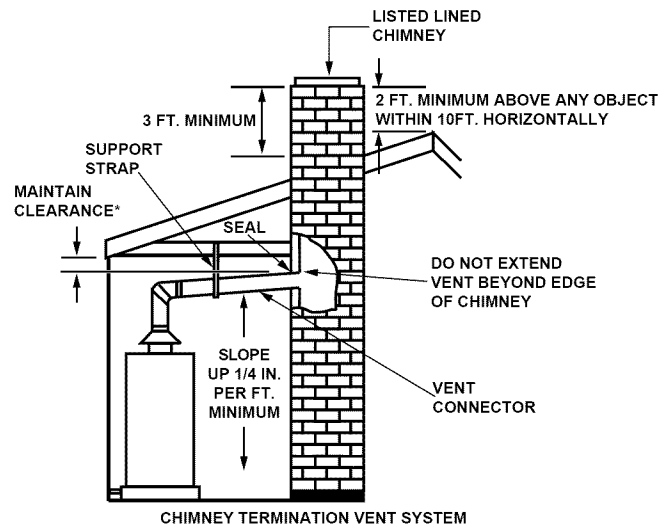


FIGURE 10.

Do not terminate the vent connector in a chimney that has not been certified for this purpose. Some local codes may prohibit the termination of vent connectors in a masonry chimney.

Vertical Exhaust Gas Vent

Vertical exhaust gas vents must be installed with U.L. listed type B vent pipe according to the vent manufacturer's instructions and the terms of its listing.

It must be connected to the water heater's draft hood by a listed vent connector or by directly originating at the draft hood opening.

Vertical gas vents must terminate with a listed cap or other roof assembly and be installed according to their manufacturer's instructions.

Gas vents must be supported to prevent damage, joint separation, and maintain clearances to combustible materials (Figures 11 and 12).

IMPORTANT: This gas vent must be terminated in a vertical position to facilitate the removal of the burnt gases.

An unused chimney flue or masonry enclosure may be used as a passageway for the installation of a gas vent (Figure 12).

Common (combined) venting is allowable with vertical type B vent systems and lined masonry chimneys as long as proper draft for the water heater is established under all conditions of operation. **CAUTION: DO NOT** common vent this water heater with any power vented appliance.

Figures 10-12 are examples of vent pipe system installations and may or may not be typical for your specific application. Consult the "National Fuel Gas Code", NFPA 54, ANSI Z223.1-current edition and the guidelines set forth by prevailing local codes.

WATER SYSTEM PIPING

Piping Installation

Piping, fittings, and valves should be installed according to the installation drawing (Figure 13). If the indoor installation area is subject to freezing temperatures, the water piping must be protected by insulation.

The water supply pressure should not exceed 80 psi. If this occurs, a pressure reducing valve with a bypass may need to be installed in the cold water inlet line. This should be placed on the supply to the entire house in order to maintain equal hot and cold water pressures.

IMPORTANT: Heat cannot be applied to the water fittings on the heater as they may contain nonmetallic parts. If solder connections are used, solder the pipe to the adapter before attaching the adapter to the hot and cold water fittings.

IMPORTANT: Always use a good grade of joint compound and be certain that all fittings are drawn up tight.

1. Install the water piping and fittings as shown in Figure 13. Connect the cold water supply (3/4" NPT) to the cold water inlet fitting. Connect the hot water supply (3/4" NPT) to the hot water outlet fitting.

IMPORTANT: Some models may contain energy saving heat traps to prevent the circulation of hot water within the pipes. Do not remove the inserts within the heat traps.

2. The installation of unions in both the hot and cold water supply lines is recommended for ease of removing the water heater for service or replacement.
3. The manufacturer of this water heater recommends installing a tempering valve or an anti-scald device in the domestic hot water line as shown in Figure 14. These valves reduce the point-of-use temperature of the water by mixing cold and hot water and are readily available for use.
4. If installing the water heater in a closed water system, install an expansion tank in the cold water line as specified under Closed System/Thermal Expansion.
5. Install a shut-off valve in the cold water inlet line. It should be located close to the water heater and be easily accessible. Know the location of this valve and how to shut off the water to the heater.
6. A temperature and pressure relief valve must be installed in the opening marked "Temperature and Pressure (T & P) Relief Valve" on the water heater. A discharge line must be added to the opening of the T&P Relief Valve. Follow the instructions under Temperature and Pressure Relief Valve.
7. After piping has been properly connected to the water heater, remove the aerator at the nearest hot water faucet. Open the hot water faucet and allow the tank to completely fill with water. To purge the lines of any excess air, keep the hot water faucet open for 3 minutes after a constant flow of water is obtained. Close the faucet and check all connections for leaks.

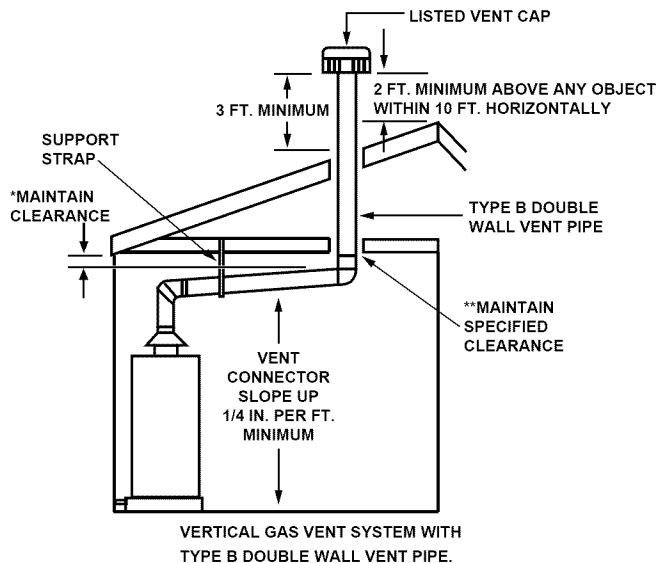


FIGURE 11.

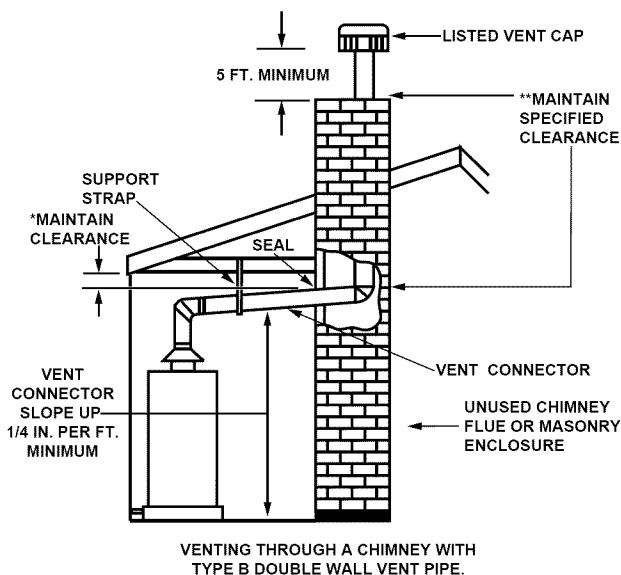


FIGURE 12.

* Maintain vent pipe clearance requirements to local, state and/or the "National Fuel Gas Code", ANSI Z223.1(NFPA 54)-current edition.

** NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances states that these chimneys are intended to be installed in accordance with the installation instructions provided with each chimney support assembly. Minimum air space clearance to combustible materials should be maintained as marked on the chimney sections.

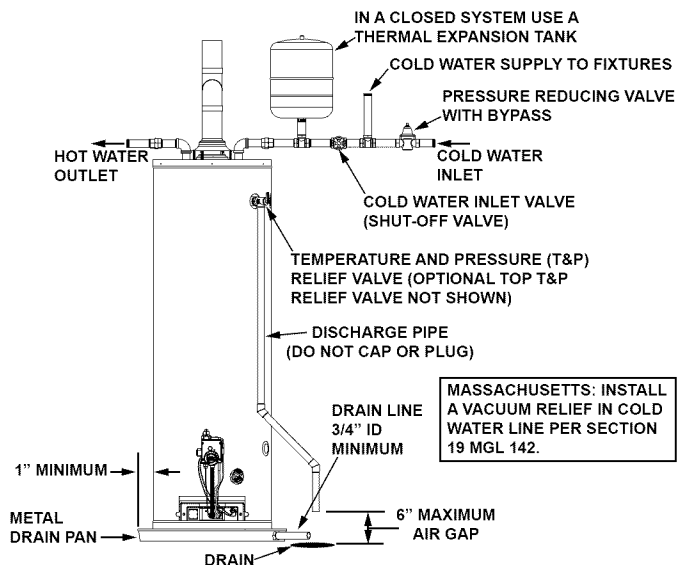


FIGURE 13.

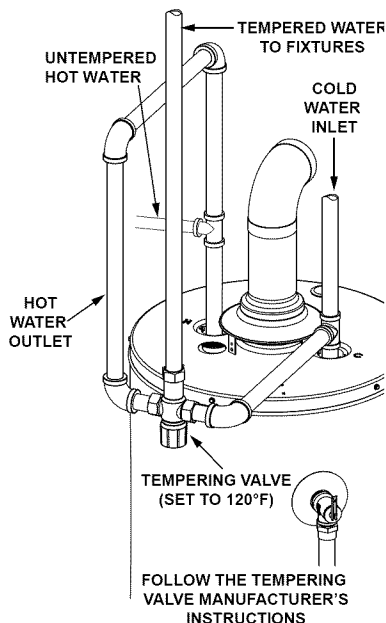


FIGURE 14.

Please note the following:

- The system should be installed only with piping that is suitable for potable (drinkable) water such as copper, CPVC, or polybutylene. This water heater must not be installed using iron piping or PVC water piping.
- Use only pumps, valves, or fittings that are compatible with potable water.
- It is recommend that only full flow ball or gate valves are used in water piping installations. The use of valves that may cause excessive restriction to water flow is not recommended.
- Use only 95/5 tin-antimony or other equivalent solder. Any lead based solder must not be used.
- Piping that has been treated with chromates, boiler seal, or other chemicals must not be used.
- Chemicals that may contaminate the potable water supply must not be added to the piping system.

Closed System/Thermal Expansion

CAUTION
Property Damage Hazard
• All water heaters eventually leak • Do not install without adequate drainage.

Periodic discharge of the temperature and pressure relief valve may be due to thermal expansion in a closed water supply system. The water utility supply meter may contain a check valve, backflow preventer or water pressure reducing valve. This will create a closed water system. During the heating cycle of the water heater, the water expands causing pressure inside the water heater to increase. This may cause the temperature and pressure relief valve to discharge small quantities of hot water. To prevent this, it is recommended that a diaphragm-type expansion tank (suitable for potable water) be installed on the cold water supply line. The expansion tank must have a minimum capacity of 1.5 U.S. gallons for every 50 gallons of stored water. Contact the local water supplier or plumbing inspector for information on other methods to control this situation.

Temperature and Pressure Relief Valve

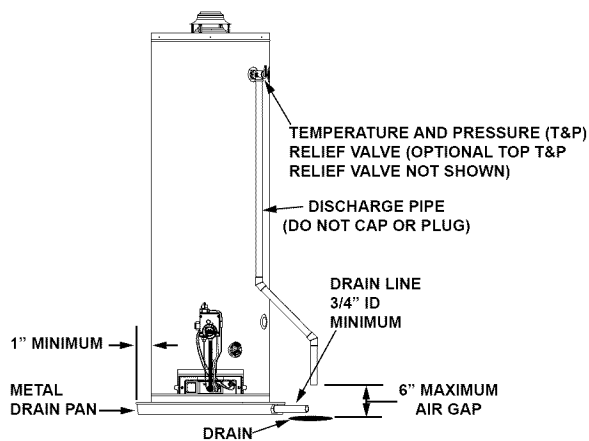
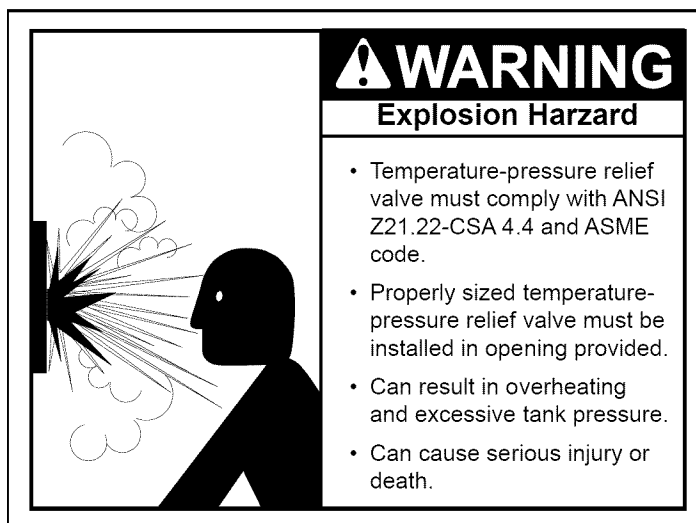


FIGURE 15A.

For protection against excessive pressures and temperatures, a temperature and pressure relief valve must be installed in the opening marked "T & P RELIEF VALVE" (see Figure 15A). This valve must be design certified by a nationally recognized testing laboratory that maintains periodic inspection of the production of listed equipment or materials as meeting the requirements for Relief Valves for Hot Water Supply Systems, ANSI Z21.22. The function of the temperature and pressure relief valve is to discharge water in large quantities in the event of excessive temperature or pressure developing in the water heater. The valve's relief pressure must not exceed the working pressure of the water heater as stated on the rating plate.

IMPORTANT: Only a new temperature and pressure relief valve should be used with your water heater. Do not use an old or existing valve as it may be damaged or not adequate for the working pressure of the new water heater. Do not place any valve between the relief valve and the tank.

The Temperature & Pressure Relief Valve:

- Must not be in contact with any electrical part.
- Must be connected to an adequate discharge line.
- Must not be rated higher than the working pressure shown on the rating plate of the water heater.

The Discharge Line:

- Must not be smaller than the pipe size of the relief

valve or have any reducing coupling installed in the discharge line.

- Must not be capped, blocked, plugged or contain any valve between the relief valve and the end of the discharge line.
- Must terminate a maximum of six inches above a floor drain or external to the building.
- Must be capable of withstanding 250°F (121°C) without distortion.
- Must be installed to allow complete drainage of both the valve and discharge line.

T&P Relief Valve and Pipe Insulation (Some Models)

1. Locate the T&P Relief Valve on the water heater.
2. Locate the slit running the length of the insulation.
3. Spread this slit open and slip it up under the T&P Relief Valve. See Figure 15B. Apply gentle pressure to the insulation to ensure it is fully seated on the T&P Relief Valve. Once sealed secure the insulation with a section of tape.

IMPORTANT: The insulation or tape should not block or cover the T&P Relief Valve drain opening. Also the insulation or tape should not block or hinder access to the T&P Relief Valve manual relief lever.

4. Next locate the hot water (outlet) & cold water (inlet) pipes to the water heater.
5. Select one of the sections of pipe insulation and locate the slit that runs the length of the insulation.
6. Spread the slit open at the base of the insulation and slip it over the cold water (inlet) pipe. Apply gentle pressure along the length of the insulation to ensure it is fully seated around the cold water pipe. Also ensure that the base of insulation is flush with the water heater. Once seated, secure the insulation with a section of tape.
7. Repeat steps 5 through 6 for the hot water (outlet) pipe.

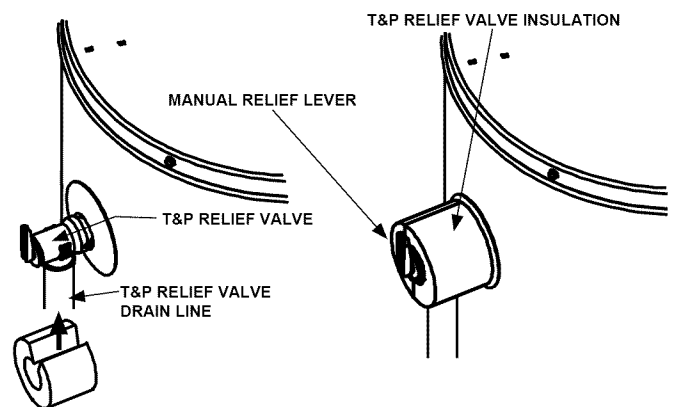


FIGURE 15B.

Combination Space Heating/Potable Water System

Some water heater models are equipped with inlet/outlet connections for use with space heating applications. If this water heater is to be used to supply both space heating and domestic potable (drinking) water, the instructions listed below must be followed.

- Be sure to follow the manual(s) shipped with the air handler system.
- This water heater is not to be used as a replacement for an existing boiler installation.
- Do not use with piping that has been treated with chromates, boiler seal or other chemicals and do not add any chemicals to the water heater piping.
- If the space heating system requires water temperatures in excess of 120°F, a tempering valve or an anti-scald device should be installed per its manufacturer's instructions in the domestic (potable) hot water supply to limit the risk of scald injury.
- Pumps, valves, piping and fittings must be compatible with potable water.
- A properly installed flow control valve is required to prevent thermosiphoning. Thermosiphoning is the result of a continuous flow of water through the air handler circuit during the off cycle. Weeping (blow off) of the temperature and pressure relief valve (T & P) or higher than normal water temperatures are the first signs of thermosiphoning.
- The domestic hot water line from the water heater should be vertical past any tempering valve or supply line to the air handler to remove air bubbles from the system. Otherwise, these bubbles will be trapped in the air handler heat exchanger coil, reducing the efficiency.
- Do not connect the water heater to any system or components previously used with non-potable water heating appliances when used to supply potable water.

Some jurisdictions may require a backflow preventer in the incoming cold water line. This may cause the temperature and pressure relief valve on the water heater to discharge or weep due to expansion of the heated water. A diaphragm-type expansion tank suitable for potable water will normally eliminate this weeping condition. Please read and follow the manufacturer's instructions for the installation of such tanks.

Also see Water System Piping for additional instructions on the safe and correct installation and operation of this water heater.

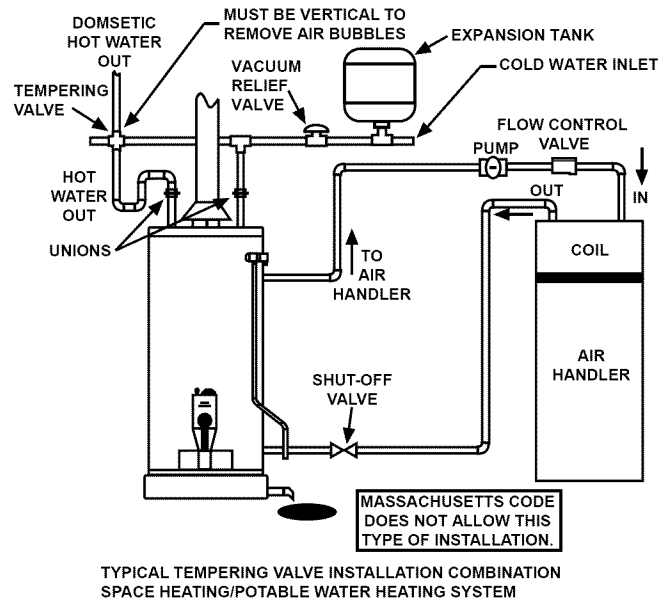


FIGURE 16.

Solar Installation

If this water heater is used as a solar storage heater or as a backup for the solar system, the water supply temperatures to the water heater tank may be in excess of 120°F. A tempering valve or other temperature limiting valve must be installed in the water supply line to limit the supply temperature to 120°F.

NOTE: Solar water heating systems can often supply water with temperatures exceeding 180°F and may result in water heater malfunction.

IMPORTANT INFORMATION ABOUT THIS WATER HEATER

This gas water heater was manufactured to voluntary safety standards to reduce the likelihood of a flammable vapor ignition incident. The new technology used in meeting these standards makes this product more sensitive to installation errors. Please review the following checklist and make any required installation upgrades or changes.

Questions? Contact Residential Technical Assistance by referencing the phone number on the water heater.

Installation Checklist

Water Heater Location

Water heater location is important and can affect system performance. Please check the following:

- ☐ Installation area free of corrosive elements and flammable materials.
- ☐ Centrally located with the water piping system (For new installations). Located as close to the gas piping and vent pipe system as possible.
- ☐ Located indoors and in a vertical position. Protected from freezing temperatures.
- ☐ Proper clearances from combustible surfaces maintained and not installed directly on a carpeted floor.
- ☐ Provisions made to protect the area from water damage. Metal drain pan installed and piped to an adequate drain.
- ☐ Sufficient room to service the water heater. See Clearances and Accessibility section of this manual.
- ☐ Water heater not located near an air moving device.
- ☐ Is the installed environment dirty (excessive amounts of lint, dirt, dust, etc.)? If so, the base-ring filter located on the bottom of the water heater will need to be cleaned periodically. Refer to the Maintenance of your Water Heater section of this manual for information on cleaning the base-ring filter.

Combustion Air Supply and Ventilation

Check for sufficient combustion air supply. Insufficient air for the combustion of gas will result in the flame becoming "lazy", thereby allowing heat to build up in the combustion chamber. This excessive heat will cause a thermal switch on the door assembly to trip. Is the water heater installed in a closet or other small, enclosed space? If so:

- ☐ Are there openings for make-up air to enter and exit the room/area?
- ☐ Are the openings of sufficient size? Remember, if there are other gas-fired or air-consuming appliances in the same room, you need more make-up air. Refer to the Location Requirements section of this water heater manual for specific requirements.

Fresh air not taken from areas that contain negative pressure producing devices such as exhaust fans, dryers, fireplaces, etc.

- ☐ Is there a furnace/air handler in the same room space as the water heater? If so, has a return air duct system been attached that exits the room? If so, check for leaks on the air duct system. If no air duct system is present, correct immediately by contacting a local Heating, Ventilation, Air-Conditioning & Refrigeration (HVAC-R) authorized service provider.
- ☐ Fresh air supply free of corrosive elements and flammable vapors.

- ☐ Fresh air openings sized correctly with consideration given to the blocking effect of louvers and grilles.
- ☐ Ductwork is the same cross-sectional area as the openings.

Vent Pipe System

Check for proper drafting at the water heater draft hood. Refer to the "Checking the Draft" section of this manual for the test procedure. If the procedure shows insufficient draft is present, please check the following.

- ☐ Draft hood properly installed.
- ☐ Vent connectors securely fastened with screws and supported properly to maintain six inch clearance.
- ☐ Vent connector made of approved material and sized correctly.
- ☐ Vent pipe system installed according to all local and state codes or, in the absence of local and state codes, the "National Fuel Gas Code", ANSI Z223.1(NFPA 54)-current edition.
- ☐ Flue baffle properly positioned in the flue tube.
- ☐ Check the vent system for restrictions/obstructions and check the vent termination height. Refer to the Combustion Air and Ventilation section of this water heater manual for specific requirements.
- ☐ Recheck for sufficient combustion air supply.

Water System Piping

- ☐ Temperature and pressure relief valve properly installed with a discharge line run to an open drain and protected from freezing.
- ☐ All piping properly installed and free of leaks.
- ☐ Heater completely filled with water.
- ☐ Closed system pressure build-up devices installed.
- ☐ Tempering valve (when applicable) installed per manufacturer's instructions (See Water Temperature Regulation section).

Gas Supply and Piping

- ☐ Gas type is the same as that listed on the water heater rating plate.
- ☐ Gas line equipped with shut-off valve, union, and drip leg.
- ☐ Use pipe joint compound or teflon tape marked as being resistant to the action of petroleum [Propane (L.P.)] gases.
- ☐ Adequate pipe size and approved pipe material.
- ☐ An approved noncorrosive leak detection solution used to check all connections and fittings for possible gas leaks. Correct any leak found.

OPERATING YOUR WATER HEATER

Lighting Instructions

Read and understand these directions thoroughly before attempting to light or re-light the pilot. Make sure the view port is not missing or damaged. (See Figure 23) Make sure the tank is completely filled with water before lighting the pilot. Check the rating plate near the gas control valve/thermostat for the correct gas. Do not use this water heater with any gas other than the one listed on the rating plate. If you have any questions or doubts, consult your gas supplier or gas utility company.

WARNING

Explosion Hazard

Replace view port if glass is missing or damaged.

Failure to do so can result in death, explosion or fire.



White Rodgers Gas Control Valve/Thermostat - Lighting Instructions

FOR YOUR SAFETY READ BEFORE LIGHTING



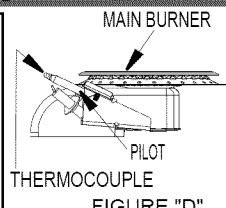
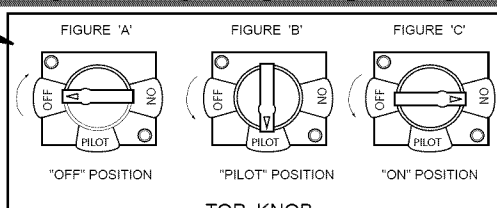
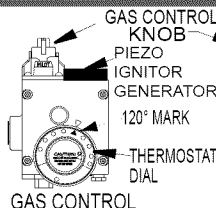
WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.



BEFORE LIGHTING: ENTIRE SYSTEM MUST BE FILLED WITH WATER AND AIR PURGED FROM ALL LINES

- This appliance has a pilot which is lit by a piezo-electric spark gas ignition system. Do not open the inner door of the appliance and try to light the pilot by hand.
 - BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS**
- Do not try to light any appliance.
 - Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
 - Do not use this appliance if any part has been under water. Immediately contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!
 - DO NOT USE THIS APPLIANCE IF THERE HAS BEEN AN IGNITION OF VAPORS. Immediately call a qualified service technician to inspect the appliance. Water heaters subjected to a flammable vapors ignition will show a discoloration on the air intake grid and require replacement of the entire water heater.

LIGHTING INSTRUCTIONS



-  **STOP!** Read the safety information above on this label.
 - Set the thermostat to lowest setting (PILOT LIGHTING). Turn thermostat dial fully clockwise  until it stops.
 - Push the gas control knob down slightly and turn clockwise  to "OFF". SEE FIGURE 'A'. NOTE: Knob cannot be turned from "PILOT" to "OFF" unless knob is pushed down slightly. Do not force.
 - Remove the outer burner door located below the gas control.
 - Wait ten (10) minutes to clear out any gas. If you then smell gas,  **STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
 - This unit is equipped with a push button pilot ignitor, which is used to light the pilot. Locate the ignitor on the gas control.
 - Turn gas control knob counterclockwise  to "PILOT". SEE FIGURE 'B'.
 - The pilot is located on the right side of the burner. It can be located by looking through the glass view port while pressing the piezo ignitor button several times. Look for a spark at the pilot location, Figure "D".
 - Once the pilot has been found, push the gas knob all the way down. Immediately press the pilot ignitor button rapidly (4) to (5) times. If the pilot will not light, repeat step (3) through (9).
 - Continue to hold the gas control knob down for about one (1) minute after the pilot is lit. Release the gas control knob and it will pop back up. Pilot should remain lit. If it goes out, repeat step (3) through (9). It may take several minutes for air to clear the lines before the pilot will light.
 - If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
 - If the pilot will not stay lit after several tries, turn the gas control knob clockwise  to "OFF" and call your service technician or gas supplier. SEE FIGURE 'A'.
 - Once the pilot flame is established replace the outer burner door.
 - At arm's length away, turn gas control knob counterclockwise  to "ON". SEE FIGURE 'C'.
 - Set thermostat to desired setting.
- ⚠ DANGER** Hotter water increases the risk of scald injury. Consult the instruction manual before changing temperature.

TO TURN OFF GAS TO APPLIANCE

- Set the thermostat to lowest setting (PILOT LIGHTING).
- Push gas control knob down slightly and turn clockwise  to "OFF". Do not force. SEE FIGURE 'A'.

Robertshaw Gas Control Valve/Thermostat - Lighting Instructions

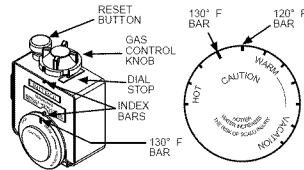
FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

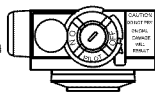
- A. This appliance has a pilot which is lighted by a piezoelectric igniter. When lighting the pilot, follow these instructions exactly.
- B. **BEFORE LIGHTING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS:
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance. Water heaters subjected to flood conditions or anytime the gas controls, main burner or pilot have been submerged in water require replacement of the entire water heater.
- E. **DO NOT USE THIS APPLIANCE IF THERE HAS BEEN AN IGNITION OF VAPORS.** Immediately call a qualified service technician to inspect the appliance. Water heaters subjected to a flammable vapors ignition will show a discoloration on the air intake grid and require replacement of the entire water heater.

LIGHTING INSTRUCTIONS

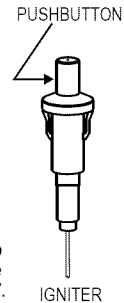
1. **STOP!** It is imperative that you read all the safety warnings before lighting the pilot.
2. Remove the outer door.
3. Turn the temperature dial counterclockwise ↺ to its lowest setting.



4. Depress the dial stop and turn gas control knob clockwise to the "OFF" position.
5. To clear any gas that may have accumulated wait ten (10) minutes. If you then smell gas, **STOP!** Follow "B" in the safety warning above. If you do not smell gas go to the next step.
6. Turn the gas control knob counterclockwise ↺ to "PILOT".



7. Depress the reset button all the way in and **IMMEDIATELY** depress the igniter button until you hear a loud click. Observe the pilot through the view port. Do not release the reset button. Repeat immediately if pilot does not light on the first try. If the pilot does not light by the fourth attempt with the igniter, repeat steps 4 - 7. Continue to hold the button for about (1) minute after the pilot is lit. Release the reset button and it will pop back up. Pilot should remain lit. If the pilot light goes out, repeat steps 3 - 7.



IMPORTANT: If the pilot will not stay lit after several tries, depress the dial stop and turn gas control knob to "OFF", then call your service technician or gas supplier.

IMPORTANT: If the reset button (see graphic at step 3) does not pop up when released, stop and immediately shut off the gas at the line valve or tank. Call your service technician or gas supplier.

8. Turn the gas control knob counterclockwise ↺ to "ON".
9. Set the temperature dial to the desired setting.
10. Replace the outer door.



TO TURN OFF GAS TO APPLIANCE

1. Turn the temperature dial counterclockwise ↺ to its lowest setting.
2. Turn the gas control knob clockwise ↻ to the "OFF" position.

Checking the Draft

⚠ WARNING

Burn Hazard

Do not touch vent.

Doing so can result in burns.

After successfully lighting the water heater, allow the unit to operate for 15 minutes and check the draft hood relief opening for proper draft (Figure 17). Make sure all other appliances in the area are operating and all doors are closed when performing the draft test. Pass a match flame around the relief opening of the draft hood. A steady flame drawn into the opening indicates proper draft.

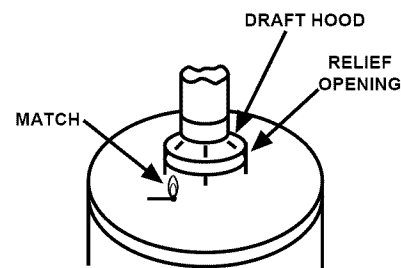


FIGURE 17.

If the flame flutters or is blown out, combustion products are escaping from the relief opening. If this occurs, do not operate the water heater until proper adjustments or repairs are made to the vent pipe system and/or air supply requirements.

Burner Flames

Inspect the burner flames through the viewport and compare them to the drawings in Figure 18. A properly operating burner should produce a soft blue flame. Blue tips with yellow inner cones are satisfactory. The tips of the flame may have a slight yellow tint. The flame should not be all yellow or have a sharp blue-orange color. Contaminated air may cause an orange colored flame. Contact a qualified technician if the flame is not satisfactory.

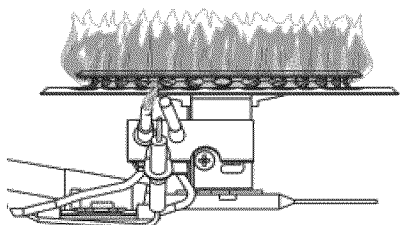
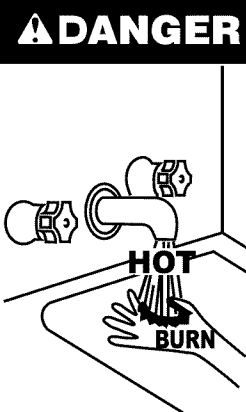


FIGURE 18.

Emergency Shut Down

IMPORTANT: Should overheating occur or the gas supply fails to shut off, turn off the water heater's manual gas control valve and call a qualified technician.

Water Temperature Regulation



⚠ DANGER

Water temperature over 125°F (52°C) can cause severe burns instantly resulting in severe injury or death.

Children, the elderly, and the physically or mentally disabled are at highest risk for scald injury.

Feel water before bathing or showering.

Temperature limiting valves are available.

Read instruction manual for safe temperature setting.

Due to the nature of the typical gas water heater, the water temperature in certain situations may vary up to 30°F (16.7 °C) higher or lower at the point of use such as, bathtubs, showers, sink, etc.

HOTTER WATER CAN SCALD: Water heaters are intended to produce hot water. Water heated to a temperature which will satisfy space heating, clothes washing, dish washing, and other sanitizing needs can scald and permanently injure you upon contact. Some people are more likely to be permanently injured by hot water than others. These include the elderly, children, the infirm, or physically/mentally handicapped. If anyone using hot water in your home fits into one of these groups or if there is a local code or state law requiring a certain temperature water at the hot water tap, then you must take special precautions. In addition to using the lowest possible temperature setting that satisfies your hot water needs, a means such as a mixing valve, should be used at the hot water taps used by these people or at the water

heater. Mixing valves are available at plumbing supply or hardware stores, see Figure 14. Follow manufacturer's instructions for installation of the valves. Before changing the factory setting on the thermostat see Figure 19. Using the lowest hot water temperature that meets your needs will also provide the most energy efficient operation of the water heater.

Never allow small children to use a hot water tap, or to draw their own bath water. Never leave a child or handicapped person unattended in a bathtub or shower.

NOTE: A water temperature range of 120°F-140°F (49°C-60°C) is recommended by most dishwasher manufacturers.

The thermostat of this water heater has been factory set at its lowest position. It is adjustable and must be reset to the desired temperature setting to reduce the risk of scald injury. The index bar (Robertshaw) and ▲ mark (White Rodgers) are indicative of approximately 120°F (49°C) and are the preferred starting points, see Figure 19. Some states have a requirement for a lower setting.

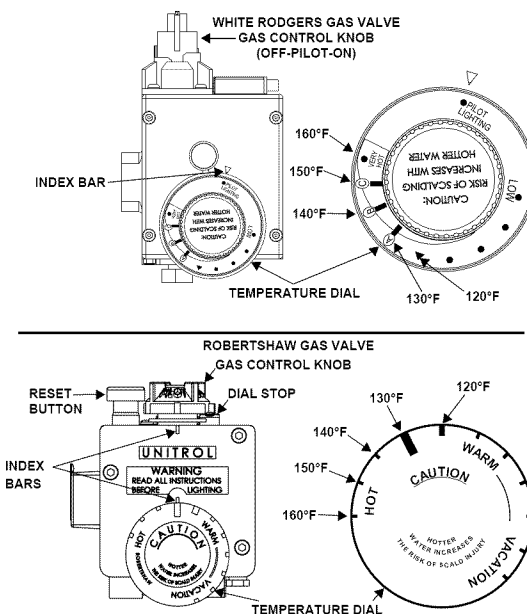
White Rodgers Valves:

Turn the water temperature dial clockwise (↻) to decrease the temperature, or counterclockwise (↻) to increase the temperature.

Robertshaw Valves:

Turn the water temperature dial clockwise (↻) to increase the temperature, or counterclockwise (↻) to decrease the temperature.

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.



Temperature Settings	Time to Produce 2nd & 3rd Degree Burns on Adult Skin
160°F (71°C)	About 1/2 second
150°F (66°C)	About 1-1/2 seconds
140°F (60°C)	Less than 5 seconds
130°F (54°C)	About 30 seconds
120°F (49°C)	More than 5 minutes
80°F (27°C)	-----

FIGURE 19.

NOTE: During low demand periods when hot water is not being used, a lower thermostat setting will reduce energy losses and may satisfy your normal hot water needs. If hot water use is expected to be more than normal, a higher thermostat setting may be required to meet the increased demand. When leaving your home for extended periods (vacations, etc.) turn the temperature dial to its lowest setting. This will maintain the water at low temperatures with minimum energy losses and prevent the tank from freezing during cold weather.

Operational Conditions

Condensation

Whenever the water heater is filled with cold water, some condensate will form while the burner is on. A water heater may appear to be leaking when in fact the water is condensation. This usually happens when:

- A new water heater is filled with cold water for the first time.
- Burning gas produces water vapor in water heaters, particularly high efficiency models where flue temperatures are lower.
- Large amounts of hot water are used in a short time and the refill water in the tank is very cold.

Moisture from the products of combustion condense on the cooler tank surfaces and form drops of water which may fall onto the burner or other hot surfaces to produce a "sizzling" or "frying" noise.

Excessive condensation can cause pilot outage due to water running down the flue tube onto the main burner and putting out the pilot.

Because of the suddenness and amount of water, condensation water may be diagnosed as a "tank leak". After the water in the tank warms up (about 1-2 hours), the condition should disappear.

Do not assume the water heater is leaking until there has been enough time for the water in the tank to warm up.

An undersized water heater will cause more condensation. The water heater must be sized properly to meet the family's demands for hot water including dishwashers, washing machines and shower heads.

Excessive condensation may be noticed during the winter and early spring months when incoming water temperatures are at their lowest.

Good venting is essential for a gas fired water heater to operate properly as well as to carry away products of combustion and water vapor.

CAUTION
Property Damage Hazard
• All water heaters eventually leak • Do not install without adequate drainage.

It is always recommended that a suitable metal drain pan be installed under the water heater to protect the area

from water damage resulting from normal condensation production, a leaking tank or piping connections. Refer to the "Location Requirements" section.

Water Heater Sounds

During the normal operation of the water heater, sounds or noises may be heard. These noises are common and may result from the following:

- Normal expansion and contraction of metal parts during periods of heat-up and cool-down.
- Condensation causes sizzling and popping within the burner area and should be considered normal.
- Sediment buildup in the tank bottom will create varying amounts of noise and may cause premature tank failure. Drain and flush the tank as directed under the "Draining and Flushing" section.

Smoke/Odor

The water heater may give off a small amount of smoke and odor during the initial start-up of the unit. This is due to the burning off of oil from metal parts of a new unit and will disappear after a brief period of operation.

Safety Shut-off

This water heater is designed to automatically shut-off in the event of the following:

- The pilot flame is extinguished for any reason.
- The water temperature exceeds 195°F (91°C).
- Excessive build up of dust on the base ring filter or flame arrestor. See Maintenance of your Water Heater Section.
- The ignition of flammable vapors.

A thermocouple is used to determine if a pilot flame is present, and will shut off the gas supply to the main burner and the pilot if the flame is absent. This unit is also equipped with a thermal switch, designed to shut off the gas supply in the event the water heater has been exposed to flammable vapors (e.g., spilled gasoline), poor combustion caused by a blocked vent or insufficient combustion air. If the thermal switch opens:

- Check the flame-arrestor for signs of high temperature (blue or black discoloration). See Figure 29.
- If there are signs of high temperature, inspect your installation for any problems with venting, combustion air supply and for a flammable vapor event (see "Pilot Light Troubleshooting Flow Chart" section). Correct any issues prior to resetting the thermal switch. If you suspect a flammable vapor incident has occurred, do not use this appliance. Immediately call a qualified technician to inspect the appliance. Water heaters subjected to a flammable vapors ignition will require replacement of the entire water heater.
- Reset the thermal switch by depressing the small button in the center of the thermal switch. Follow the Lighting Instructions found on the front of your water heater. A high temperature limit switch or ECO (Energy Cut Off) in the tank is used to shut off the unit if the water temperature exceeds 180°F (83°C). The ECO is a single-use switch, which, if activated, requires complete replacement of the entire gas control valve/thermostat. If the ECO should activate, the water heater cannot be used until the gas control valve/thermostat is replaced by a qualified technician. Contact your local dealer for service information.

Anode Rod/Water Odor

Each water heater contains at least one anode rod, which will slowly deplete while protecting the glass-lined tank from corrosion and prolonging the life of the water heater. Once the anode is depleted, the tank will start to corrode, eventually developing a leak. Certain water conditions will cause a reaction between this rod and the water. The most common complaint associated with the anode rod is a "rotten egg smell" produced from the presence of hydrogen sulfide gas dissolved in the water. **IMPORTANT:** Do not remove this rod permanently as it will void any warranties. The parts list includes a special anode that can be ordered if water odor or discoloration occurs. **NOTE:** This rod may reduce but not eliminate water odor problems. The water supply system may require special aeration or chlorination equipment from a water conditioning company to successfully eliminate all water odor problems.

The use of a water softener may decrease the life of the water heater tank.

The anode rod should be removed from the water heater tank every 3 years for inspection. The following are typical (but not all) signs of a depleted anode rod:

- The majority of the rods diameter is less than 3/8".
- Significant sections of the support wire (approx. 1/3 or more of the anode rod's length) are visible.

If the anode rod shows signs of either or both it should be replaced. **NOTE:** Whether reinstalling or replacing the anode rod, check for any leaks and immediately correct if found.

In replacing the anode:

1. Turn off gas supply to the water heater.
2. Shut off the water supply and open a nearby hot water faucet to depressurize the water tank.
3. Drain approximately 5 gallons of water from tank (Refer to the "Draining and Flushing" section for proper procedures). Close drain valve.
4. Remove old anode rod.
5. Use Teflon® tape or approved pipe sealant on threads and install new anode rod.
6. Turn on water supply and open nearby hot water faucet to purge air from water system. Check for any leaks and immediately correct any if found.
7. Restart the water heater as directed under the "Operating Your Water Heater." See the "Repair Parts Illustration" section for anode rod location.

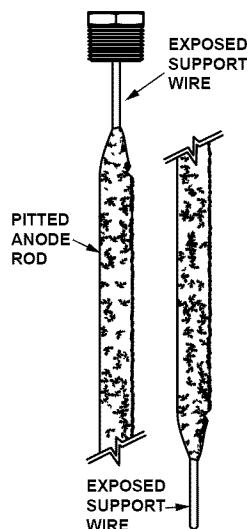
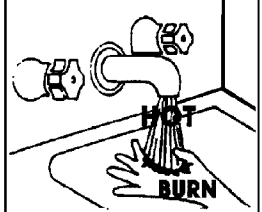


FIGURE 20.

TEFLON® is a registered trademark of E.I. Du Pont De Nemours and Company

Draining and Flushing

	⚠ DANGER • Hot water discharge burn hazard. • Keep clear of relief valve discharge unit. • Temperature limiting valves are available. • Read instruction manual for safe temperature setting.
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It is recommended that the tank be drained and flushed every 6 months to remove sediment which may build up during operation. The water heater should be drained if being shut down during freezing temperatures. To drain the tank, perform the following steps:

1. Turn off the gas to the water heater at the manual gas shut-off valve.
 2. Close the cold water inlet valve.
 3. Open a nearby hot water faucet.
 4. Connect a hose to the drain valve and terminate it to an adequate drain.
- NOTE:** The drain hose should be rated for at least 200°F. If the drain hose does not have this rating, open the cold water inlet valve and a nearby hot faucet until the water is no longer hot.
5. Open the water heater drain valve and allow all the water to drain from the tank. Flush the tank with water as needed to remove sediment.
 6. Close the drain valve, refill the tank, and restart the heater as directed under the "Operating Your Water Heater" section.

If the water heater is going to be shut down for an extended period, the drain valve should be left open.

IMPORTANT: Condensation may occur when refilling the tank and should not be confused with a tank leak.

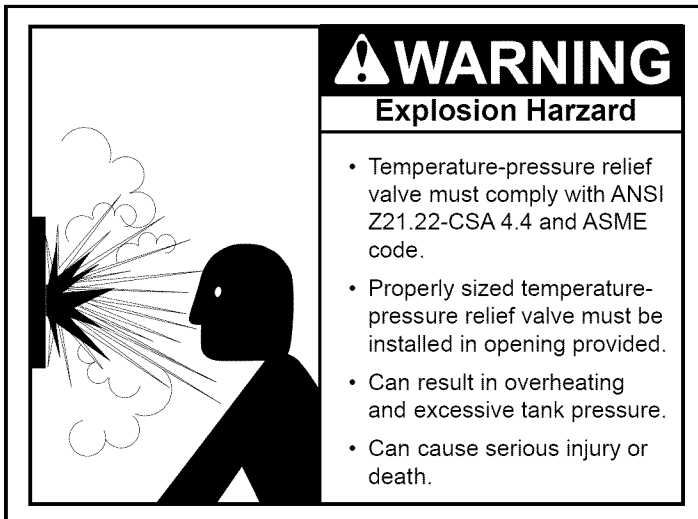
Routine Preventive Maintenance

At least annually, a visual inspection should be made of the venting and air supply system, piping systems, main burner, pilot burner, and flame-arrestor. Check the water heater for the following:

- Obstructions, damage, or deterioration in the venting system. Make sure the ventilation and combustion air supplies are not obstructed.
- Clean any dust or debris from the base-ring filter.
- Soot and/or carbon on the main burner and pilot burner. Contact a qualified technician.
- Leaking or damaged water and gas piping.
- Presence of flammable or corrosive materials in the installation area.
- Presence of combustible materials near the water heater.
- After servicing this water heater, check to make sure it is working properly. (See "Operating Your Water Heater" section of this manual.)

IMPORTANT: If you lack the necessary skills required to properly perform this visual inspection, you should not proceed, but get help from a qualified technician.

Temperature and Pressure Relief Valve



Manually operate the temperature and pressure relief valve at least once a year to make sure it is working

properly. To prevent water damage, the valve must be properly connected to a discharge line which terminates at an adequate drain. Standing clear of the outlet (discharged water may be hot), slowly lift and release the lever handle on the temperature and pressure relief valve to allow the valve to operate freely and return to its closed position. See Figure 21. If the valve fails to completely reset and continues to release water, immediately shut off the manual gas control valve and the cold water inlet valve and call a qualified technician.

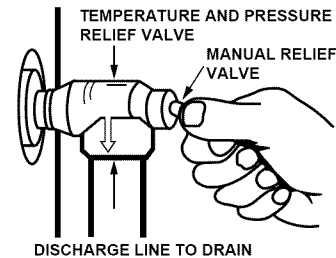


FIGURE 21.

MAINTENANCE OF YOUR WATER HEATER

Replacement Parts

IMPORTANT: The following maintenance procedures are for the FVIR System components and should be performed by a qualified technician.

Replacement parts may be ordered through your plumber or the local distributor. Parts will be shipped at prevailing prices and billed accordingly. When ordering replacement parts, always have the following information ready:

1. model, serial, and product number
2. type of gas
3. item number
4. parts description

See Repair Parts Section for a list of available repair parts.

Removing the Manifold/Burner Assembly

1. Turn off the gas supply to the water heater at the manual gas shut-off valve. This valve is typically located beside the water heater. Note the position of the shut-off valve in the open/on position then proceed to turn it off (Figure 3).
2. On the lower front of the water heater locate the gas control valve/thermostat (see Figure 23). Before performing any maintenance, it is important to turn the temperature dial on the gas control valve/thermostat to its lowest setting.
3. On top of the gas control valve/thermostat turn the gas control knob to the "OFF" position. **NOTE:** On the Robertshaw gas control valve/thermostat the dial stop must first be depressed before turning the gas control knob (Figure 19).

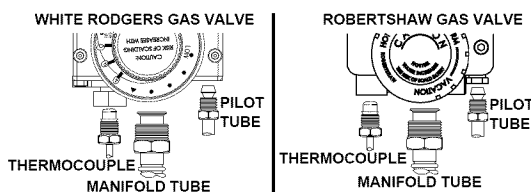


FIGURE 22.

4. Remove the outer door.
5. Remove the two screws securing the manifold door assembly to the combustion chamber (Figure 23).

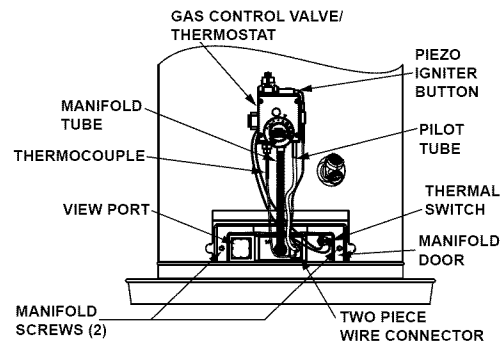


FIGURE 23.

6. Disconnect the thermocouple (right-hand thread), pilot tube, the igniter wire from the igniter button, the two connectors attached to the thermal switch, and manifold tube at the gas control valve/thermostat. (Figures 22 & 23.) **NOTE:** L.P. Gas systems use reverse (left-hand) threads on the manifold tube.
7. Grasp the manifold tube and push down slightly to free the manifold, pilot tube, and thermocouple.
8. Carefully remove the manifold/burner assembly from the burner compartment. **NOTE:** Be sure not to damage internal parts.

Removing the Burner from the Manifold/Burner Assembly

Natural Gas (Low Nox) & L.P. Gas Burner

1. Take off the burner by removing the two (2) screws located underneath the burner.

2. Check the burner to see if it is dirty or clogged. The burner may be cleaned with soap and hot water (Figure 24).

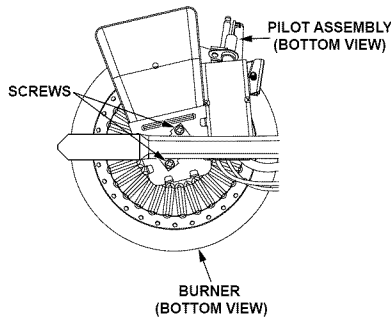


FIGURE 24.

Replacing the Thermocouple

1. Remove the manifold/burner assembly as directed previously.
2. Remove the retainer clip from the back of the two piece wire connector and remove the two piece wire connector from the manifold door (Figure 25).
3. Remove the burner, see Removing the Burner from the Manifold/Burner Assembly.
4. Pull the thermocouple from the pilot assembly (Figure 26).

IMPORTANT: Be careful not to bend or alter the position of the pilot assembly components.

5. Insert the thermocouple tip into the holes provided in the pilot bracket until it clicks into place. **NOTE:** The base of the thermocouple must be flush with the base of the pilot bracket.
6. Position the new thermocouple through the larger opening of the two piece wire connector (Figure 25). Be sure igniter wire is positioned through the small opening of the two piece wire connector.
7. Re-attach the burner. Note the orientation of the burner (Figure 24.)
8. See Replacing the Manifold/Burner Assembly.

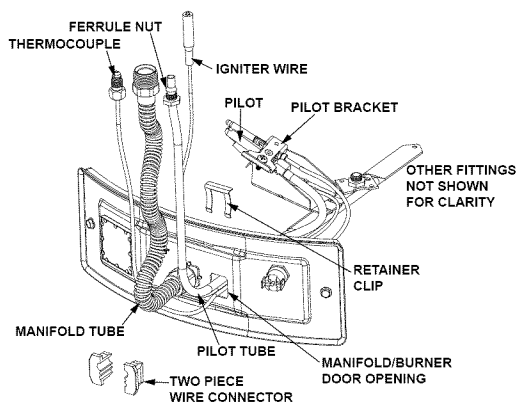


FIGURE 25.

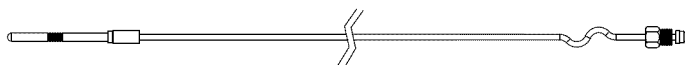


FIGURE 26.

Replacing the Pilot/ Pilot Tube Assembly

1. Remove the manifold/burner assembly. See Removing the Burner from the Manifold/Burner Assembly.
2. Lift the retainer clip straight up from the back of the two piece wire connector (using a flat-blade screwdriver), then remove the two piece wire connector from the manifold door (Figure 25.)

IMPORTANT: Be careful not to bend or alter the position of the pilot tube, it will be used as a bending template for the new assembly.

3. Take off the burner by removing the two (2) screws located underneath the burner. See Figure 24.
4. Remove and keep the screw securing the pilot assembly to the pilot bracket. (Figure 27)
5. Remove and keep the old pilot/pilot tube assembly.
6. Using the old pilot/pilot tube assembly as a guide, bend the new pilot tube and new thermocouple to match the old ones. **NOTE:** Make only the bends closest to the pilot before going to the next step. (Figure 27)

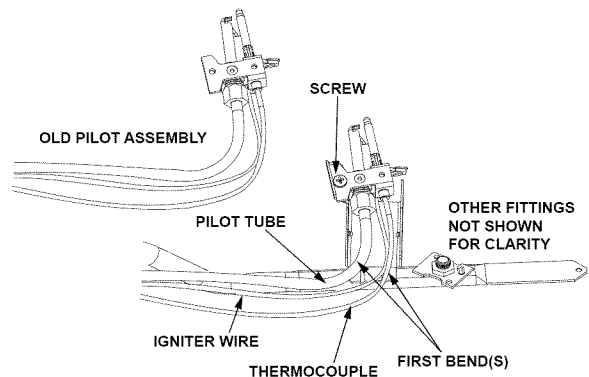


FIGURE 27.

7. Route the new pilot tube, thermocouple, and igniter wire through the manifold/burner door opening. (Figure 25)
8. Re-attach the pilot assembly to the pilot bracket and secure using the screw removed earlier.
9. Position the new pilot tube through the largest opening of the two piece wire connector. **NOTE:** The largest opening should be located at the top position. The igniter wire should be located in the middle opening and thermocouple in the bottom opening. (Figure 28)

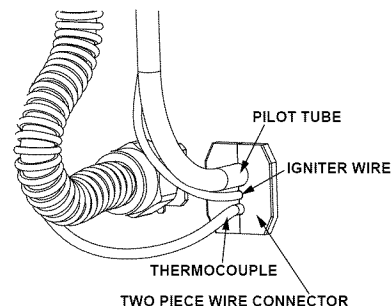


FIGURE 28.

10. Reposition the two piece wire connector in the manifold door opening and secure it with the retainer clip.
11. Carefully bend the new pilot tube and thermocouple to match the bend of the manifold tube. **NOTE:** When bending **DO NOT** crimp or crease the pilot tube or thermocouple. (Figure 25)
12. Place the new brass ferrule nut on the pilot tube before proceeding to the next step.
13. See Replacing the Manifold/Burner Assembly.

External Inspection & Cleaning of the Base-Ring Filter

1. At least annually check the base-ring filter (Figure 26) for any dust or debris that may have accumulated on the filter screen. **NOTE:** If the water heater is located in an area that is subjected to lint and dirt, it may be necessary to check the base-ring filter more frequently.
2. Follow the Lighting Instructions to turn off the water heater and allow it to cool for 10 minutes before attempting to clean the base-ring filter.
3. Use a vacuum cleaner with a hose attachment to remove any dust or debris that may have accumulated on the filter. **NOTE:** If unable to inspect or clean the base-ring filter, follow the "Cleaning the Combustion Chamber and Flame-arrestor" instructions.
4. After the base-ring filter has been cleaned, follow the Lighting Instructions to return the water heater to service.

Cleaning the Combustion Chamber and Flame-arrestor

1. Follow procedure outlined in "Removing the Manifold/Burner Assembly".
2. Use a vacuum cleaner/shop vac to remove all loose debris in the combustion chamber (Figure 29). Use compressed air to clear any dust or debris that may have accumulated in the flame-arrestor.

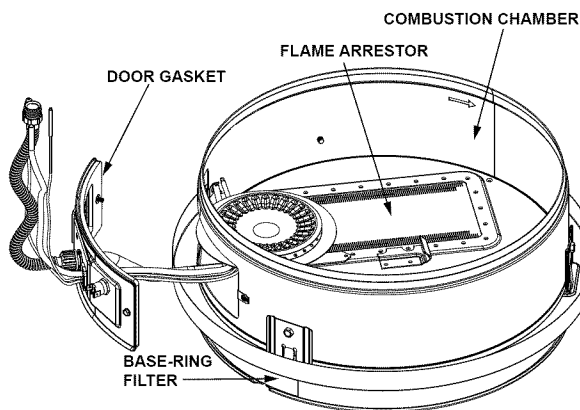


FIGURE 29.

3. Reassemble following the procedure under "Replacing the Manifold/Burner Assembly".

Replacing the Manifold/Burner Assembly

⚠ WARNING



Explosion Hazard

- Tighten both manifold door screws securely.
- Remove any fiberglass between gasket and combustion chamber.
- Replace viewport if glass is missing or damaged.
- Replace two piece wire connector if missing or removed.
- Replace door gasket if damaged.
- Failure to follow these instructions can result in death, explosion, or fire.

1. Check the door gasket for damage or imbedded debris prior to installation.
2. Inspect the view port for damage and replace as required.
3. Insert the manifold/burner assembly into the burner compartment making sure that the tip of the manifold tube engages in the slot of the bracket inside the combustion chamber (Figure 30).
4. Inspect the door gasket and make sure there is no fiberglass insulation between the gasket and the combustion chamber.
5. Replace the two screws, which secure the manifold/burner assembly door to the combustion chamber and tighten securely. Once the manifold/burner assembly door is tightened, visually inspect the door gasket between the manifold/burner assembly door and the combustion chamber for spaces or gaps that would prevent a seal. **IMPORTANT:** Do not operate the water heater if the door gasket does not create a seal between the manifold door and the combustion chamber.
6. Reconnect the two wire leads to the thermal switch, the manifold tubing, pilot tubing, and thermocouple to the gas control valve/thermostat. **NOTE:** L.P. gas systems use reverse (left-hand) threads on the manifold tube. Do not cross-thread or apply any thread sealant to these fittings. The thermocouple nut should be started and turned all the way in by hand. An additional quarter turn with a 7/16" open-end wrench will then be sufficient to seat the lockwasher.

7. Reconnect the igniter wire.
8. Turn gas supply on and refer to the Lighting Instructions.
9. With the burner lit, check the gas control valve/thermostat supply line, two piece wire connector, manifold tube, and pilot tube connections for leaks. Check for leaks by brushing on an approved noncorrosive leak detection solution. Bubbles forming indicate a leak. Correct any leak found. **IMPORTANT:** All leaks must be fixed immediately.
10. Replace the outer door.

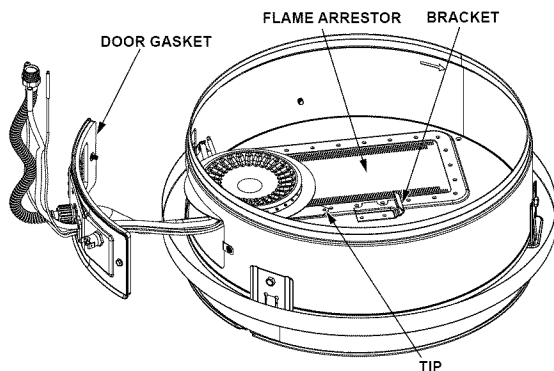


FIGURE 30.

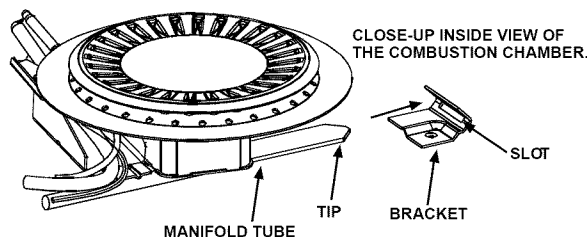
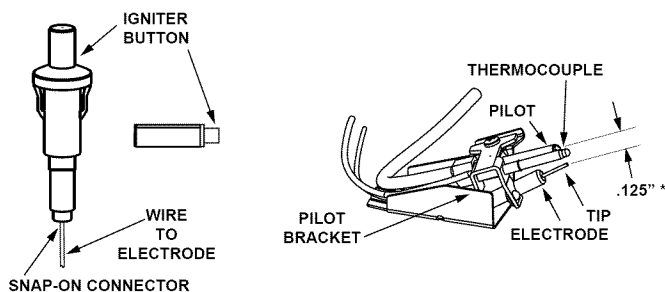


FIGURE 31.

Piezoelectric Igniter System

The piezoelectric igniter system consists of the igniter button, electrode, and wire. The pilot is ignited by an electric spark generated when the igniter button is pressed. The spark gap of 0.125 inch is set when the electrode is installed at the factory. (Figure 32). Use only factory authorized piezoelectric igniter parts for replacement.



* NOTE: SPARK GAP DISTANCE MEASURED FROM ELECTRODE TIP TO PILOT.

FIGURE 32.

Testing the Igniter System

Turn off the gas to the water heater at the manual gas shut-off valve. Watch the electrode tip while activating the igniter. A visible spark should jump from the electrode. To avoid shock, do not touch the burner or any metal part on the pilot or pilot assembly. If no spark is visible, check the wire connections and make sure the electrode is not broken. Replace the igniter if defective. Dirt and rust on the pilot or electrode tip can prevent the igniter spark. Wipe clean with a damp cloth and dry completely. Rust can be removed from the electrode tip and metal surfaces by lightly sanding with an emery cloth or fine grit sandpaper.

Removing and Replacing the Gas Control Valve/Thermostat

IMPORTANT: This water heater has a resettable thermal switch installed. Do not attempt to disable or modify this feature in any way. Use only factory authorized replacement parts.

Removing the Gas Valve:

1. Turn off the gas supply to the water heater at the manual gas shut-off valve. This valve is typically located beside the water heater. Note the position of the shut-off valve in the open/on position then proceed to turn it off (Figure 3).
2. On the lower front of the water heater locate the gas control valve/thermostat (see Figure 23). Before performing any maintenance, it is important to turn the temperature dial on the gas control valve/thermostat to its lowest setting.
3. On top of the gas control valve/thermostat turn the gas control knob to the "OFF" position. **NOTE:** On the Robertshaw gas control valve/thermostat the knob stop must first be depressed before turning the gas control knob. See Lighting Instructions on the water heater.
4. Drain the water heater. Refer to the section of "Draining and Flushing" section and follow the procedure.
5. Disconnect the igniter wire from the igniter. **NOTE:** There are two types of igniters. If you have the square igniter, slide the igniter bracket backwards away from the gas valve to remove it. If you have the round igniter, first remove the igniter from the bracket by depressing front and rear holding tabs and lift. Next remove igniter bracket from the gas valve. Disconnect the thermocouple (right-hand threads), pilot tube, and manifold tube at the gas control valve/thermostat (Figure 22). **NOTE:** L.P. gas systems use reverse (left-hand) threads on the manifold tube.
6. Refer to "Gas Piping" section (Figure 3) and disconnect the ground joint union in the gas piping. Disconnect the remaining pipe from the gas control valve/thermostat.
7. To remove the gas control valve/thermostat, thread a correctly sized pipe into the inlet and use it to turn the gas control valve/thermostat (counterclockwise.) Do not use pipe wrench or equivalent to grip body. Damage may result, causing leaks.

Do not insert any sharp objects into the inlet or outlet connections. Damage to the gas control valve/thermostat may result.

Replacing the Gas Valve:

1. To replace the gas control valve/thermostat, reassemble in reverse order. When replacing the gas control valve/ thermostat, thread a correctly sized pipe into the inlet and use it to turn the gas valve (clockwise.) DO NOT OVER TIGHTEN or damage may result. NOTE: Use an approved TEFLON® tape or pipe compound only on the threaded section of the gas control valve/thermostat that screws into the tank.
2. Reconnect the gas piping to the gas control valve/ thermostat. NOTE: Use an approved Teflon tape or pipe compound on the gas piping connections.
3. Attach the igniter and bracket to the new gas control valve/thermostat, clipping it at the back edge of thermostat and snapping it into place. NOTE: Do not use the (pilot) ferrule nut supplied with the new gas control valve/thermostat, unless the existing nut is not usable. Reconnect the pilot tube, manifold tube, igniter wire, and thermal switch wires. NOTE: L.P. gas systems use reverse (left-hand) threads on the manifold tube.
4. Fill the tank completely with water. NOTE: To purge the lines of any excess air, keep the hot water faucet open for 3 minutes after a constant flow of water is obtained.
5. Turn on the gas supply and test the gas supply connections by brushing on an approved noncorrosive leak detection solution. Bubbles forming indicate a leak. Correct any leak found.
6. Check the operation of the burner by following the lighting instructions on the front of the water heater. With the burner lit, check the gas control valve/ thermostat supply line, manifold tube and pilot tube connections for leaks.
7. Verify proper operation and then replace the outer door.
8. If additional information is required, contact Residential Technical Assistance by referencing the number on the water heater.

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FVIR System Operational Checklist

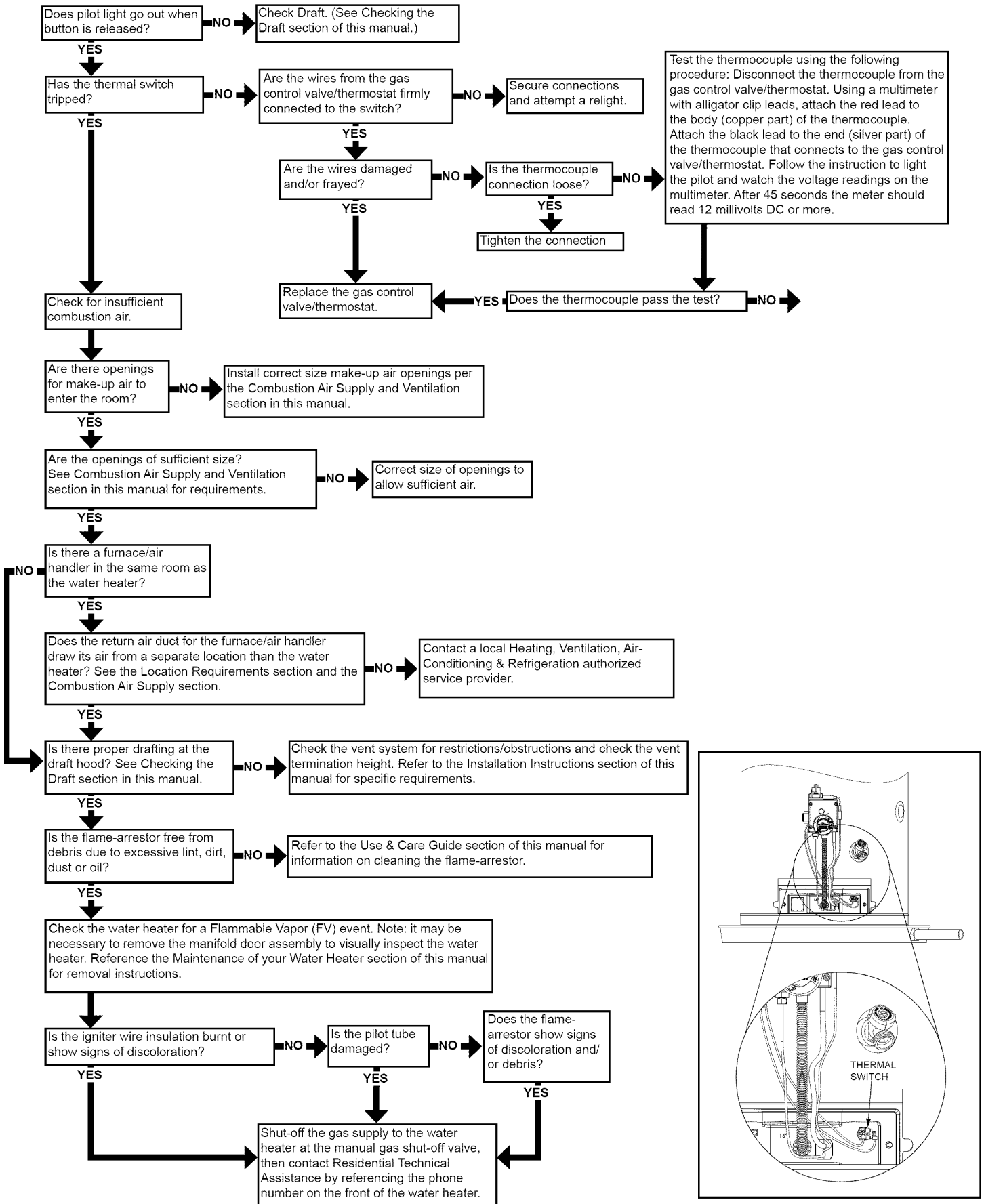
1. Manifold gasket properly sealed.
2. Viewport not damaged or cracked.
3. Flame-arrestor free of debris and undamaged.
4. Two piece wire connector properly installed.
5. No leaks at pilot and manifold connection.
6. Manifold door screws securely tightened.
7. Depress the button on the thermal switch

TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
BURNER WILL NOT IGNITE	1. Pilot not lit 2. Thermostat set too low 3. No gas 4. Dirt in the gas lines 5. Pilot line clogged 6. Main burner line clogged 7. Non-functioning thermocouple 8. Non-functioning thermostat 9. Heater installed in a confined area	1. Light pilot 2. Turn temp. dial to desired temperature 3. Check with gas utility company 4. Notify utility-install trap in gas line 5. Clean, locate source and correct 6. Clean, locate source and correct 7. Replace thermocouple 8. Replace thermostat 9. Provide fresh air ventilation
SMELLY WATER	1. Sulfides in the water	1. Replace the anode with a special anode
BURNER FLAME YELLOW-LAZY	1. Insufficient secondary air 2. Low gas pressure 3. Water heater flue or vent system blocked 4. Main burner line clogged 5. Heater installed in a confined area 6. Obstruction in main burner orifice	1. Provide ventilation to water heater 2. Check with gas utility company 3. Clean, locate source and correct 4. Clean, locate source and correct 5. Proper fresh air ventilation 6. Clean or replace orifice
PILOT WILL NOT LIGHT OR REMAIN LIT	1. Non-functioning igniter 2. The thermal switch tripped 3. Wire lead connection at thermal switch loose 4. Thermocouple connection loose 5. Air in gas line 6. Low gas pressure 7. No gas 8. Dirt in gas lines 9. Cold drafts 10. Thermostat ECO switch open 11. Pilot line or orifice clogged 12. Non-functioning thermocouple 13. Air for combustion obstructed 14. Flammable vapors incident, FVIR function actuated	1. Replace igniter pilot assembly 2. See Pilot Light Troubleshooting Flowchart section 3. Remove and reconnect the wire leads at thermal switch, confirm connections are tight and not loose 4. Finger tighten; then 1/4 turn with wrench 5. Bleed the air from the gas line 6. Check with gas utility company 7. Check with gas utility company 8. Notify utility-install dirt trap in gas line 9. Locate source and correct 10. Replace thermostat 11. Clean, locate source and correct 12. Replace thermocouple 13. See maintenance section for inspection and cleaning of flame trap 14. Replace water heater, eliminate flammable vapors source. Contact Residential Technical Assistance

PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
HIGH OPERATION COSTS	1. Thermostat set too high 2. Sediment or lime in tank 3. Water heater too small for job 4. Wrong piping connections 5. Leaking faucets 6. Gas leaks 7. Wasted hot water 8. Long runs of exposed piping 9. Hot water piping in exposed wall	1. Set temperature dial to lower setting 2. Drain/flush-provide water treatment if needed 3. Install adequate heater 4. Correct piping-dip tube must be in cold inlet 5. Repair faucets 6. Check with utility-repair at once 7. Advise customer 8. Insulate piping 9. Insulate piping
INSUFFICIENT HOT WATER	1. Thermostat set too low 2. Sediment or lime in tank 3. Water heater too small 4. Wrong piping connections 5. Leaking faucets 6. Wasted hot water 7. Long runs of exposed piping 8. Hot water piping in outside wall 9. Low gas pressure	1. Turn temperature dial to desired setting 2. Drain/flush-provide water treatment if needed 3. Install adequate heater 4. Correct piping-dip tube must be in cold inlet 5. Repair faucets 6. Advise customer 7. Insulate piping 8. Insulate piping 9. Check with gas utility company
SLOW HOT WATER RECOVERY	1. Insufficient secondary air 2. Water heater flue or vent system blocked 3. Low gas pressure 4. Improper calibration 5. Thermostat set too low 6. Water heater too small 7. Wrong piping connections 8. Wasted hot water	1. Provide ventilation to water heater. Check flue way, flue baffle, and burner 2. Clean flue, locate source and correct 3. Check with gas utility company 4. Replace thermostat 5. Turn temperature dial to desired setting 6. Install adequate heater 7. Correct piping-dip tube must be in cold inlet 8. Advise customer
DRIP FROM RELIEF VALVE	1. Excessive water pressure 2. Heater stacking 3. Closed water system	1. Use a pressure reducing valve and relief valve 2. Lower the thermostat setting 3. See "Closed System/Thermal Expansion"
THERMOSTAT FAILS TO SHUT-OFF	1. Thermostat not functioning properly 2. Improper calibration	1. Replace thermostat 2. Replace thermostat
COMBUSTION ODORS	1. Insufficient secondary air 2. Water heater flue or vent system blocked 3. Heater installed in a confined area	1. Provide ventilation to water heater. Check flue way, flue baffle, and burner 2. Clean, locate source and correct 3. Provide fresh air ventilation
SMOKING AND CARBON FORMATION (SOOTING)	1. Insufficient secondary air 2. Low gas pressure 3. Water heater flue or vent system blocked 4. Thermostat not functioning properly 5. Heater installed in a confined area 6. Burner flame yellow-lazy	1. Provide ventilation to water heater. Check flue way, flue baffle, burner 2. Check with gas utility company 3. Clean, locate source and correct 4. Replace thermostat 5. Provide fresh air ventilation 6. See "Burner Flame Yellow-Lazy"
CONDENSATION	1. Temperature setting too low	1. Increase the temperature setting
BURNER FLAME FLOATS AND LIFTS OFF PORTS	1. Orifice too large 2. High gas pressure 3. Water heater flue or vent system blocked 4. Cold drafts	1. Replace with correct orifice 2. Check with gas utility company 3. Clean flue and burner-locate source and correct 4. Locate source and correct
BURNER FLAME TOO HIGH	1. Orifice too large	1. Replace with correct orifice
FLAME BURNS AT ORIFICE	1. Thermostat not functioning properly 2. Low gas pressure	1. Replace thermostat 2. Check with gas utility company
PILOT FLAME TOO SMALL	1. Pilot line or orifice clogged 2. Low gas pressure	1. Clean, locate source and correct 2. Check with gas utility company

PILOT LIGHT TROUBLESHOOTING FLOWCHART



REPAIR PARTS ILLUSTRATION

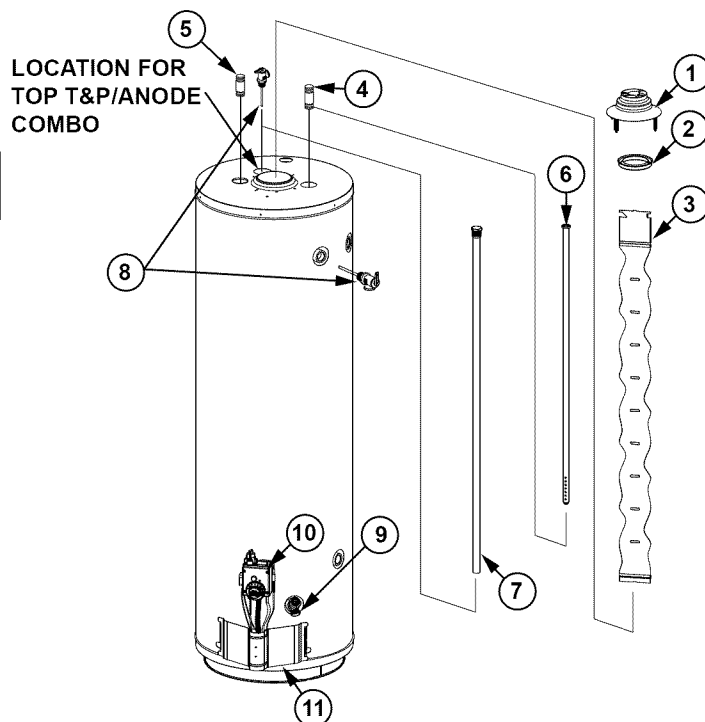
When ordering repair parts always give the following information:

1. Model, serial, and product number
2. Type of gas
3. Item number
4. Parts description

Repair Parts List

Item No.	Parts Description
1	DRAFT HOOD
2	REDUCER RING - SOME MODELS
3	FLUE BAFFLE
4	HEAT TRAP/NIPPLES(COLD) - SOME MODELS
5	HEAT TRAP/NIPPLES (HOT) - SOME MODELS
6	COLD WATER DIP TUBE
7	ANODE ROD ▲
8	TEMPERATURE & PRESSURE RELIEF VALVE (LOCATED TOP OR SIDE) ■
9	DRAIN VALVE
10	GAS CONTROL VALVE/THERMOSTAT(with wire leads) ★
11	OUTER DOOR
12*	PILOT/PILOT TUBE ASSEMBLY KIT (Natural Gas) ★
13*	PILOT/PILOT TUBE ASSEMBLY KIT (L.P. Gas) ★
14*	BURNER (Natural Gas) ★
15*	BURNER (L.P. Gas) ★
16*	MANIFOLD DOOR ASSEMBLY (Natural Gas/Low Nox) ★
17*	MANIFOLD DOOR ASSEMBLY (L.P. Gas) ★
18*	TWO PIECE WIRE CONNECTOR WITH RETAINER CLIP ★
19*	MANIFOLD DOOR GASKET ★
20*	VIEW PORT ASSEMBLY ★
21*	PIEZOELECTRIC IGNITER BUTTON
22*	THERMOCOUPLE

*Pictured on next page.

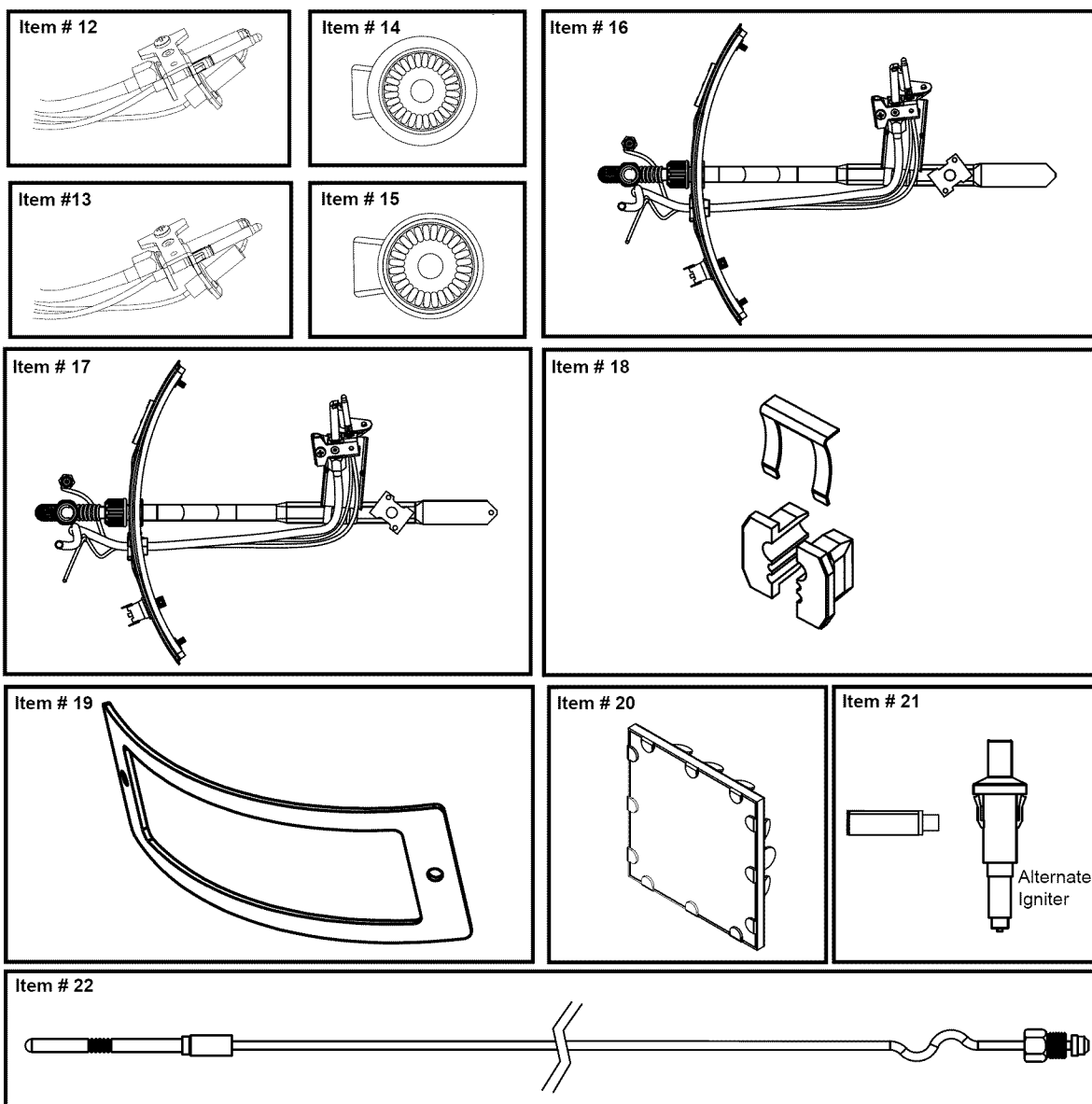


LEGEND

- ▲ Special anode rod (see Anode Rod/Water Odor section)
- Temperature and Pressure Relief Valve is required, but may not be factory installed
- ★ Unique: FVIR System parts

Listed Parts Kits and Illustrations

- Item 12: Pilot/Pilot Tube Assembly kit, which contains the pilot assembly, thermocouple, igniter electrode and retainer clip (Natural Gas)
- Item 13: Pilot/Pilot Tube Assembly kit, which contains the pilot assembly, thermocouple, igniter electrode and retainer clip (L.P. Gas)
- Item 14: Burner (Natural Gas/Low Nox)
- Item 15: Burner (L.P. Gas)
- Item 16: Manifold door assembly which contains the manifold tube, gasket, door, pilot tube, thermocouple, two piece wire connector with retainer clip, thermal switch, and pilot assembly. (Natural Gas/Low Nox)
- Item 17: Manifold door assembly which contains the manifold tube, gasket, door, pilot tube, thermocouple, two piece wire connector with retainer clip, thermal switch, and pilot assembly. (L.P. Gas)
- Item 18: Contains two piece wire connector and retainer clip
- Item 19: Contains manifold door gasket
- Item 20: Contains view port
- Item 21: Contains piezoelectric igniter button
- Item 22: Contains thermocouple



NOTES

LIMITED RESIDENTIAL GAS WARRANTY

THIS WARRANTY IS APPLICABLE TO THE ORIGINAL OWNER ONLY in accordance with the warranty terms and conditions specified below.

The warrantor will furnish the ORIGINAL OWNER, 1) a replacement water heater of equivalent size and current model if the glass-lined tank in this water heater leaks and, 2) a replacement part for any component part which fails.

THE WATER HEATER REPLACEMENT MODEL OR PART WILL BE WARRANTED FOR ONLY THE UNEXPIRED PORTION OF THE ORIGINAL WARRANTY. The warranty period will be determined by the original date of purchase of the water heater, or in the absence of a Bill of Sale verifying said date, from the date of manufacture indicated on rating plate affixed to this water heater. This warranty is not transferable and applies to models listed below:

SERIES	TANK	PARTS
Conservationist XGV, XGVL	10-Year	10-Year
ProMax 10-Year Models XCV, XCVL, XCVH, XVR, XCVT, XCVX	10-Year	6-Year
ProMax 6-Year Models GCV, GCVL, GCVH, GVR, GCVT, GCVX, GCNH, GNR, GVCA, GVRA	6-Year	6-Year

When the water heater has been used for other than single family residential application;

1. The tank warranty shall be reduced to 1 year for 6 year models and to 3 years for 10 year models.
2. The parts warranty shall be reduced to 1 year for all models.

CONDITIONS AND EXCEPTIONS

This warranty shall apply only when the water heater is installed and operated in accordance with 1) all local fire codes and plumbing codes, ordinances and regulations, 2) the printed instructions provided with it, 3) good industry practices, and 4) proper safety practices such as but not limited to a properly sized drain pan if installed in an area where leakage from the tank or its connections would result in damage to the area adjacent to the heater. In addition, a new temperature and pressure relief valve, certified by the Canadian Gas Association must have been properly installed and piped to the nearest drain.

This warranty shall apply only when the heater is:

- owned by the original purchaser;
- installed for indoor operation only;
- used at temperatures not exceeding the maximum calibrated setting of its thermostat;
- used at water pressure not exceeding the working pressure shown on the heater;
- filled with potable water, free to circulate at all times and with the tank free of damaging water sediment or scale deposits;

- used in a non-corrosive and non-contaminated atmosphere;
- used with factory approved anode(s) installed;
- in its original installation location;
- in the United States, its territories or possessions, and Canada;
- sized in accordance with proper sizing techniques for residential water heaters;
- bearing a rating plate which has not been altered, defaced or removed except as required by the warrantor;
- used in an open system or in a closed system with a properly sized and installed thermal expansion tank;
- operated with properly installed drip leg in the gas supply line;
- fired with the fuel for which it was factory built;
- fired at the factory rated input;
- operated with the inner and outer combustion chamber doors in place and all factory seals to combustion chamber intact.
- installed with no attempted, nor actual modification or alteration of the water heater's design in any way, including but not limited to, the attachment of non-company approved appliances or equipment.

Any accident to the water heater or any part thereof (including freezing, fire, floods, or lightning), any misuse, abuse or alteration of it, any operation of it in a modified form, any operation of the water heater on desalinated (deionized) water, or any damage caused by attempts to repair tank leaks or parts, will void this warranty. This warranty does not cover water heaters replaced for cosmetic reasons or for reasons of noise, taste, odor, discolored and/or rusty water. This warranty does not apply to water heaters used to heat pools, whirlpools or hot tubs or used for space heating where its sizing does not conform with specifications of the heating component manufacturer.

This warranty gives you specific legal rights, and you may have other rights which vary under the laws of each state. If any provision of this warranty is prohibited or invalid under applicable state law, that provision shall be ineffective to the extent of the prohibition or invalidity without invalidating the remainder of the affected provision or the other provisions of this warranty.

SERVICE AND LABOR RESPONSIBILITY

UNDER THIS LIMITED WARRANTY, THE WARRANTOR WILL PROVIDE ONLY A REPLACEMENT WATER HEATER OR PART THEREOF. THE OWNER IS RESPONSIBLE FOR ALL OTHER COSTS. Such costs may include but are not limited to:

- a. Labor charges for service, removal, or reinstallation of the water heater or part thereof.
- b. Shipping and delivery charges for forwarding the new water heater or replacement part from the nearest distributor and returning the claimed defective heater or part to such distributor.
- c. All cost necessary or incidental for handling and administrative charges, and for any materials and/or permits required for installation of the replacement heater or part.

LIMITATION ON IMPLIED WARRANTIES

Implied warranties, including any warranty of merchantability imposed on the sale of this heater under state law are limited to one year duration for the heater or any of its parts. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

CLAIM PROCEDURE

Any claim under this warranty should be initiated with the dealer who sold the heater, or with any other dealer handling the warrantor's products. If this is not practical, the owner should contact: A. O. Smith Water Heaters, 500 Tennessee Waltz Parkway, Ashland City, Tennessee 37015. Phone: 1.800.527.1953 or visit our website: www.hotwater.com.

Replacement Parts may be ordered through authorized servicers or distributors. Refer to your local Yellow Pages for where to call or contact A. O. Smith Water Heater Parts Fulfillment, 125 Southeast Parkway, Franklin, TN 37068, phone: 1.800.433.2545.

The warrantor will only honor replacement with identical or similar water heater or parts thereof which are manufactured or distributed by the warrantor.

Dealer replacements are made subject to in-warranty validation by warrantor.

PROOF-OF-PURCHASE AND PROOF-OF-INSTALLATION DATE ARE REQUIRED TO SUPPORT WARRANTY CLAIM FROM ORIGINAL OWNER. THIS FORM DOES NOT CONSTITUTE PROOF-OF-PURCHASE OR PROOF-OF-INSTALLATION.

DISCLAIMERS

NO EXPRESSED WARRANTY HAS BEEN OR WILL BE MADE ON BEHALF OF THE WARRANTOR WITH RESPECT TO THE MERCHANTABILITY OF THE HEATER OR THE INSTALLATION, OPERATION, REPAIR OR REPLACEMENT OF THE HEATER OR PARTS. THE WARRANTOR SHALL

NOT BE RESPONSIBLE FOR WATER DAMAGE, LOSS OF USE OF THE UNIT, INCONVENIENCE, LOSS OR DAMAGE TO PERSONAL PROPERTY, OR OTHER CONSEQUENTIAL DAMAGE. THE WARRANTOR SHALL NOT BE LIABLE BY VIRTUE OF THIS WARRANTY OR OTHERWISE FOR DAMAGE TO ANY PERSONS OR PROPERTY, WHETHER DIRECT OR INDIRECT, AND WHETHER ARISING IN CONTRACT OR IN TORT.

Should governmental regulations or industry standards prohibit the Manufacturer from furnishing a comparable model replacement under this warranty, the Owner will be furnished with the closest comparable water heater meeting the then current governmental regulations and industry standards. A supplementary fee may be assessed to cover the additional cost associated with the changes made to meet applicable regulations and standards.

IMPORTANT INFORMATION

Model Number _____

Serial Number _____

INSTALLATION INFORMATION

Date Installed _____

Company's Name _____

Street or P.O. Box _____

City, State, and Zip Code _____

Phone Number _____

Plumber's Name _____